April 1992 Issue #9

Radio Fun

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"The beginner's guide to the exciting world of amateur radio."

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Dayton '92

Get ready for the 1992 Dayton Hamvention. This year's show should attract nearly 35,000 hams during the three day event. According to Hamvention chairman Ross Brown WA8DQH, last year's show brought in over 32,000 attendees from all 50 states, over 30 countries and every continent!

The Dayton show is well worth the trip to Ohio. Imagine a huge arena filled with just about every amateur radio manufacturer, publication and special interest group (over 260 exhibitors). It takes most of a day at a full run just to see most of the booths. If you've become overloaded looking at all of the displays in the arena, try browsing through the huge 24-acre flea market located just outside of the arena, with 2,400 spaces! Whether it's a hard-to-find part, a special piece of used equipment or a widget, you'll probably find it in the flea market. This year look for a few super-special and spectacular displays and events in the flea market.

There will be dozens of forums during the show in seven separate conference rooms inside Hara arena. Whatever your special area of interest, you'll find it discussed in one of these forums.

The Hamvention starts at 8:00 a.m. (inside exhibits open at noon) on Friday, April 24, and goes through Sunday afternoon, April 26. For directions give a call on the W8BI 146.94 repeater or the 224.94 machine. The Hamvention is sponsored by the Dayton Amateur Radio Association (DARA) and is run by over 500 volunteers from the DARA group and area hams. See you in Dayton! *(For a complete list of this year's forums, see page 7.)*

The Hara Arena — Site of the Dayton Hamvention.

Just a few of last year's over 30,000 Dayton Hamvention attendees.

Earthwinds Delayed

The launch of the Earthwinds manned balloon flight has been delayed until next November. This flight will take three balloonists on a record-breaking non-stop journey around the world while traveling with the jet stream at 35,000 feet in a pressurized gondola. They almost launched the massive two-balloon system early Saturday morning, February 22, from the Loral Airbase in Akron, Ohio. Unfortunately, the wind speed at ground level never became calm enough to completely assemble and launch the balloon system. The 180-foot-tall balloon is capable of lifting in excess of 20,000 pounds and contains over 300,000 cubic feet of helium.

Jet stream conditions, as well as the weather around the world, are not favorable for the flight after February. Therefore, the decision was made to delay the trip until next November when worldwide weather conditions give the crew their best chance at a successful circumnavigation of the globe.

The pilot of the balloon, Larry Newman KB7JGM, will activate the amateur radio experiment during the flight on a frequency of 28.303 MHz. Thanks to the efforts of Bob Rau N8IYD, Jud Nichols N8RXT, and Bill Brown WB8ELK, a voice telemetry system was designed to relay the balloon's latitude, longitude and ground speed, based on data obtained from the onboard GPS (Global Positioning Satellite) system. It will transmit the information at 15, 30, 45 and 55 minutes past each hour during the flight. Special thanks go to Loney Duncan and Jerry Knight of Rockwell International who integrated the telemetry package with the gondola's HF radio.

Soviet Ham Magazine

Glasnost strikes again. A new Soviet publication, "Soviet Ham Press Digest," is now available in the US. As its name implies, it's a compilation of information on amateur radio in Russia; sources include official publications, newspaper stories, and DX newsletters. What's really nice about this Russian publication is that it's all in English. If interested, write the Prometheus Amateur Association, c/o George Yankopolus NA3O, 13 Glen Meadow Dr., Glen Mills PA 19342. *TNX "The Parking Ticket," February 1992.*

Photos Taken From Amateur Satellite UO-22 Available

UO-22, the latest amateur satellite to be launched, has been taking snapshots of the earth from its vantage point in space. Harold Price NK6K has been downloading those images at his station and processing them into a standard image display format (GIF). The GIF format is one of the more popular image display formats because many of the popular computers can run GIF display software.

Harold downloads the image and does some image processing, which includes removing "sparkles" (caused by random bit errors) and rearranging the image so that north is up. Finally, he converts the image into the GIF format. He is AMSAT's version of "taking your film to the little yellow hut in the middle of the parking lot." It is unclear at this point whether Harold's house is painted yellow or not.

Harold has made a number of "keepers" available on a dial-up BBS. Many of the images are in the 150 to 300 kB size.

He has placed all of the good ones on the WB6YMH BBS at (213) 541-2503. This BBS has an HST dual standard modem supporting up to 14,400 bps. The files are in the Microsat directory; just enter "cdmicosat" after you get on, "dir" to see the list, and "sz<name>" to use Zmodem, or "Xmodem" to use Xmodem. *TNX Westlink Report #610, via "The Mike and Key."*

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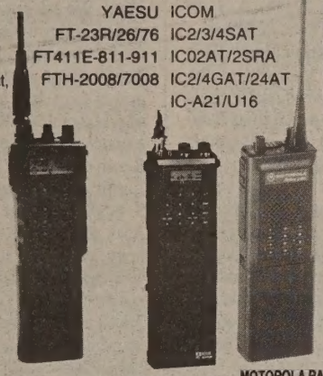

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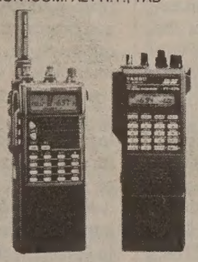

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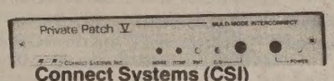

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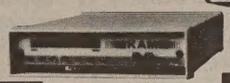

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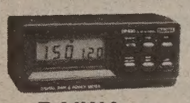

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S-Meters

What are they and how do you use them?

by Alan Glasser NY2G

Perhaps the three most often used gauges of "how'm I doin" in amateur radio are your signal report (the R-S-T system), how you sound to the other radio operator, and your signal strength on the other operator's S-meter.

While the first two gauges are mostly interpretive, e.g. "your signal report is 5-9," "You are full-quieting into the machine (repeater)," the S-meter gives a definite analog or digital indication of signal strength which can be interpreted as "how I'm doin": "You're doin an S7 on the meter," "You're 20 dB over S9," "You're hitting me with a 10-pounder (heaven forbid you say that on amateur radio!)."

Yet the S-meter is the most misunderstood indicator appearing on the amateur receiver." Whoa . . .," you say. "It tells me the signal strength of the signal I'm receiving!" Ah ha!. It does, but it indicates the *relative* signal strength. Relative to what? Well, that's what this article is all about.

A Little History

Before there were S-meters, all you had were your ears to determine relative signal strength. The RST system is:

R = Readability: 1 - "Unreadable" through 5 - "Perfectly Readable."

S = Signal Strength: 1 - "Faint Signals," barely perceptible, through 9 - "Extremely Strong Signals."

T = Tone (for CW operation): 1 - "Extremely Rough Hissing Note" through 9 - "Purest DC Note."

Another system which allowed for the interpretation of "how'm I doin?" is "Q" signals. Some "Q" signals are:

QSA = "What is the strength of my signal?" 1 - "Scarcely Perceptible" through 5 - "Very Good."

QRK = "What is my signal intelligibility?" 1 - "Unreadable" through 5 - "Perfectly readable."

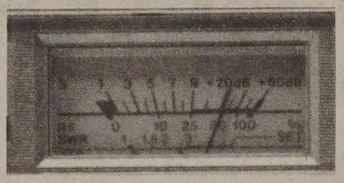
QSB = "Is my signal fading?"

And there are more.

This all went on from about the beginning of radio, because everybody wanted to know "how'm I doin," and continues even to this very day.

S-Meters

Determining relative signal strength got a little easier with the advent of the modern day superheterodyne-type receiver. The superheterodyne receiver contained a special circuit (among other circuits) called

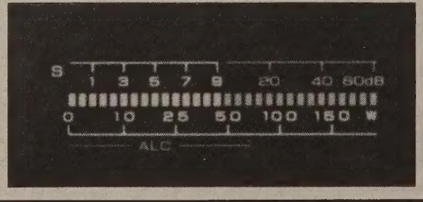


the Automatic Volume Control (AVC), also known as the Automatic Gain Control (AGC) (almost the same thing). They both keep the speaker level relatively constant by controlling the gain of the RF stage during fading and signal strength variations. The voltage developed in the AVC/AGC circuits used to control the RF stage is the same voltage used in the S-meter circuit. So if there is an extremely weak signal present at the receiver input, and the receiver volume control is preset, the AVC/AGC sends a voltage to the RF stage to make it work at maximum gain. If a strong signal is present at the receiver input, the AVC/AGC sends voltage to the RF stage to reduce gain so the speaker volume remains relatively constant. IT IS THIS VARIABLE CONTROL VOLTAGE THAT THE "S" METER CIRCUIT IS MEASURING TO MAKE IT WORK.

Before I go on, let's discuss another type of S-meter circuit that you may come across. While not a true signal strength meter, it measures the average *audio* signal *before* the volume control. I have one of these S-meters, which. I added to a Heathkit HW-8 direct conversion receiver. Again, it's relative.

Let's get back to our real S-meter. If the AVC/AGC control voltage is proportional to the signal strength at the receiver input then all we have to do is hook up a meter to this voltage, measure it, and come up with an appropriate scale on our meter face to indicate signal strength! No guessing!

A good place to start would be our RST system. "S" stands for signal strength and we have nine numbers to choose from, so let's label our meter from one to nine. That's a start. Signal strength could be "S" = 1-2-3-4-5-6-7-8-9. Hmmm . . . If this is going to work we'd better find out how much signal strength at the receiver input would give a reading. From past experiments I know that a 50 microvolt (μV) signal at the receiver input is an extremely strong signal. So let's say that that 50 μV signal across the 50 ohm input of the receiver antenna terminal represents an S-9 meter reading. Working backwards (reducing signal strength by approximately one-half, or 6 dB) we get: S-8 = 25 μV, S-7 = 12.5 μV, S-6 = 6.25 μV, S-5 = 3.1 μV, S-4 = 1.5 μV, S-3 = 0.75 μV, S-2 = 0.37 μV, S-1 = 0.18 μV. (See Table 1.)



As you can see, each increase of one S-unit is a 6 dB increase, which is equivalent to a doubling in *voltage* at the receiver input. DO NOT CONFUSE A *6 dB* CHANGE DOUBLING *VOLTAGE* WITH A *3 dB* CHANGE DOUBLING *POWER*!

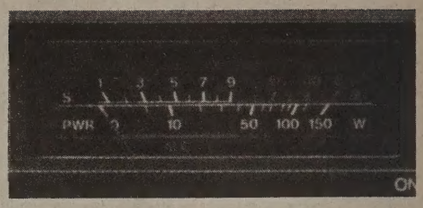
A short explanation about dB is in order here. The intensity of the sound we hear is measured in bels (named after Alexander Graham Bell) and expressed in dBs (one dB equals one-tenth of a bel). The range of intensities to which the ear is sensitive is about a millionfold. Because of this large range of intensities, a logarithmic scale has been adopted for expressing the level of intensities of sound. The average person can detect a twofold change in sound intensity. Therefore, a twofold change in voltage at the receiver input, let's say 25 μV to 50 μV (which just happens to be a 6 dB change), is equivalent to a one S-unit change. Since the S-meter circuit measures voltage in the AVC/AGC circuit, receivers use voltage ratios in their S-meter circuits, instead of power ratios.

So what happens when our receiver gets a signal at its input that is more than 50 μV (S-9)? You would think that the meter would increase by increments of 6 dB since each S-unit was 6 dB. Wrong. S-meters are calibrated in 10 dB increments above S-9 up to about 60 dB (maybe this is because we have 10 fingers and 10 toes). Anything above S-9 is said to be so many dB over S-9, e.g. "Your signal is 20 dB over S-9." (See Table 2.)

This is all well and good if your receiver's S-meter is calibrated for 50 μV at S-9. My Kenwood TS-430S is as good as many others are, but my Radio Shack HTX-100 and Uniden HR-2600 specify a *100* μV signal for S-9!

Furthermore, it is highly unlikely to get the same sensitively between different receivers.

I said it was relative!



Applications

Let's see if we can make some use out of all this besides giving relative signal reports.

Suppose we are receiving a signal and our S-meter indicates an S-3. That's about 0.75 μV at the *receiver* input. We ask our friend on the other end to increase power. He increases it from 100 watts to 1,000 watts output. That's a power ratio of 10, or a 10 dB power gain. It is also a voltage ratio of 3.162 or a 10 dB voltage gain. This equates to a gain of about 1-5/8 of an S-unit on our meter. Remember, each S-unit is 6 dB apart. We are now up to S-4-5/8. Next, we ask him to switch from the dipole to his 10 dB gain beam and point it towards us. He's now beaming 10,000 watts effective radiated power (ERP) towards us. That's an additional 1-5/8 S-unit. Now we're up to S-6-1/4. We switch from our dipole to our beam and turn it towards him. That's another 10 dB gain. Wow! That's like increasing his effective radiated power to 100,000 watts. Our S-meter is now reading S-7-7/8, almost an S-8, which is also 25 μV at the receiver input.

We started out at S-3 and now have an S-8. Let's see . . . that's an S-meter gain of 5 S-units, but it took an increase in power from 100 watts to 100,000 watts to achieve it. That's *1,000* times the original power of 100 watts for 5 S-units.

Another way to make good use of the S-meter on our receiver is to use it for an antenna system "tuner-upper, squeeze all the juice I can out of the antenna" meter. Since the S-meter is calibrated in S-units at 6 dB apart, we can make additions and changes to our antenna system and measure them *IF* we have a STEADY SIGNAL SOURCE to use as a reference. Perhaps a *local* beacon on 10 or 20 meters. Or another station that is close to you and is willing to transmit a steady carrier. Please follow the FCC rules concerning steady carriers.

Using your S-meter, you can measure the front-to-back ratio of your newly constructed beam, or measure increased gain by replacing a lossy coax with one with less dB loss per foot, etc. I have even tuned up receivers using the S-meter.

So there you have it, some relative information on S-meters. But don't stop here. Do some experiments. Next time you tune-up using your antenna system tuner, don't transmit. Receive! Find a steady signal and tune-up by watching the S-meter. Go out and get a good book that explains dB in detail. Almost everything in amateur radio has some reference to dB. RF

Contact Alan Glasser NY2G at 2133 66th St., Brooklyn NY 11204.

Table 1

S-1	0.18 μV
S-2	0.37 μV
S-3	0.75 μV
S-4	1.50 μV
S-5	3.10 μV
S-6	6.25 μV
S-7	12.50 μV
S-8	25.00 μV
S-9	50.00 μV

Table 2.

10 dB over S-9 =	158 μV (50 μV x 3.162)
20 dB over S-9 =	500 μV (50 μV x 10)
30 dB over S-9 =	1,581 μV (50 μV x 31.62)
40 dB over S-9 =	5,000 μV (50 μV x 100)
50 dB over S-9 =	15,810 μV (50μV x 316.2)
60 dB over S-9 =	50,000 μV (50 μV x 1000)

Radio Fun

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letters

Write to: Radio Fun , Editorial Offices, Forest Rd., Hancock, NH 03449

John Ahlstrom KCØZL(/VP5), Wichita KS Once upon a time (All good stories start this way, don't they?) I had the opportunity to go to a place called Provo. Upon questioning, I found that Provo is the local name for Providenciales Island in the Turks and Caicos. It was an "all expenses paid" type trip. How could I turn it down?

At the last minute I started to think about doing a little ham operating from the islands. I called the ARRL and got a post office box number on Provo for license requests! It was already too late to write so I would just have to wait until I got to the islands and mail local.

The day I arrived I noticed antennas at several places on the island. Some were next door to the place I was to stay at. On the day after I arrived I went for a walk and just had to go past the place with the antennas.

I could hear the sound of SSB coming from inside. I might as well knock on the door. See what I could find out about hamming, if anything.

Dave Mathews VP5TAO, a charter boat owner, was the one making all the SSB sounds. Dave had me talk for a while, then we had a little visit. Dave called Mike Scism VP5P/WV5M, and Mike had me drop by his work QTH. A quick look at my ham license and a few dollars, and the application for a license was in!

After three or four days of calling Mike I got the go ahead to operate with a /VP5 after my home call. I did bring a 2 meter rig with me and Jody VP5JM was my first QSO on the island. The island repeater is on 22/ 82.

I didn't bring any other ham gear with me, but I did have access to a commercial-type radio that would work in the ham bands. I did make several contacts using this radio.

About a week after I got the OK to operate, one of the fellows with me told me there was another ham moving into the area. Didn't take me long to meet Dan Crampton VE4IY/ VP5. Dave had a rig with him! Didn't take long to get his rig on the air. Dan built and installed several versions of dipoles. We used all of them. Soon I spent more time at Dave's place than I did at mine.

The three most memorable QSOs were as follows. One was when I answered an SSB CQ. The guy had one of those little 25 watt mobile rigs sitting in a parking lot. I could just picture the snow and cold with the steam coming from his mouth as we spoke. On the second one, I answered a CQ on CW that was slow but steady. I had to call him twice to get an answer. I could just tell by the sending that he didn't know what kind of a call I was. (I didn't think you could hear trembling on CW.) The third was a guy who asked me where I took my test to upgrade and what did I upgrade to? I had to think about that one for a short time. I guess the slash might look like an upgrade.

I just had to take time off for some snorkeling. Next time I guess I will have to give the diving a try.

Between all the tourist type things to do and work, I still managed to contact about 478 stations. Contacts were about four AMTOR, and the rest CW and SSB. (I practiced code so much that I passed the FCC Third Class Radiotelegraph test when I got home!)

I stayed in the Novice part of the bands a lot to give Novice operators a chance at the /VP5 call. While /VP5 may not be on the endangered list, a lot of people still seemed to want it. I really did try to work as many as possible.

If you ever want to be DX, try Provo. You can have a ball operating and still have time for some sun and fun. Write to Mike Scism VP5P, PO Box 350164, Ft. Lauderdale FL 33335 for license info, etc.

Dorrick Minnis KC6WQJ, Winters CA Hi folks. I just wanted to share with your readers something that I do to bring in some new people to our hobby.

Whenever I go to the doctor or dentist, I take a copy of your magazine with me. I simply leave it behind when I go.

I don't know about your doctor, but mine has lame magazines to read. Maybe, just maybe, somebody will pick up and read that copy of *Radio Fun*. I also make a point of listing the phone number of the local club.

Dorrick - Great idea! I hope others will follow your lead. – David N1GPH

John F. Albright WA3ZGL, Reading PA I have been reading and enjoying every issue of *Radio Fun*. It's nice to see a magazine for beginners and the not-too-technical hams among us. I've been in ham radio for years, but a lot of the hobby is still new to me.

I enjoy the articles about old rigs one can find at hamfests and I also like to check out and build some of the projects you print.

I take *Radio Fun* to work and hand it out to some of my friends and try to get them interested in our great hobby. It works!

Since this magazine is aimed at the newcomers to the hobby, and you tell them about getting a ticket, looking for equipment and other activities related to hamfests, why don't you put a listing of hamfests in your magazine? I would like to see it included.

John - Glad you like the magazine Check out the article about used gear on page 6 of this issue.

Hmmm . . . an activities calander? Not a bad idea. I wish we had the space. When we get a little extra space we'll be sure to add one. – David N1GPH

Albert W. Noble, Jr., N1IMY, Sanford ME Thanks for publishing a great ham radio magazine. *Radio Fun* has really helped me get a better understanding of what amateur radio is all about. I have read issues one through six about five times each. Keep up the good work. How about a ham radio crossword puzzle to make an already fun magazine even more fun?

Anybody out there good at writing crosswords? – David N1GPH

More letters on page 25

Buyer's Guide to Used HF Rigs

A low-cost way to get on the HF bands.

by Michael A. Forhan WB8RNB

Getting on the worldwide "shortwave," or HF, bands is considered by many to be the ultimate in ham radio. However, the high cost of a new radio is often discouraging to those on a budget. Indeed, some prospective hams give up altogether after browsing through the latest catalogs.

The best low-cost way to get on HF is by purchasing a used radio. But, like automobiles, the buyer must be careful to avoid buying a "lemon"! This article will discuss how to determine what type of radio is best for individual needs, and how to buy a dependable used rig.

Buying a Used vs. a New Radio

Most often, the biggest reason for buying a used radio is price. However, some rigs, like the Drake TR series, are becoming classics and are gaining status as collectors' items. Older models are not likely to have "modern" features like digital displays or WARC band capability. Many are tube-type and require "tuning up" when changing frequencies. Also, the rig's condition and reliability will depend on its treatment and maintenance by previous owners.

What to Look For

The first step is to define what type of radio you need. Over the years, radios of all types and descriptions have been manufactured. Will the radio be used for CW only? Is AM capability a must? How about 160m capability? Start by making a list of what features are needed.

Used HF radios have changed considerably in recent years, developing from basic tube-type radios with analog displays to all-transistor units with digital displays and multiple memories. Some newer models also include general coverage receiver capability. A few models will operate on the WARC bands with the use of the auxiliary positions on the band switch. These radios usually require optional components to operate on the new bands.

A list of popular radios for the last decade are shown in Table 1, along with the basic features and approximate price. (My apologies, in advance, to those whose favorite rig I have omitted!) Bear in mind that the prices are approximate. Prices will vary according to the condition and the optional features installed, as well as the general demand for that specific model.

A word about kits is in order. A number of kit-built radios are on the used market, and many of them are excellent. However, keep in mind that the quality of the radio depends on the skills of the builder. On the positive side, repairing a kit is a great way to learn about transceivers, as the manuals are usually very good and the radios are fairly easy to service.

Where to Buy

Probably the best source for a used radio is a friend who is ready to sell and move up to a newer rig. Chances are that you have a pretty good idea about the radio's capabilities and condition in this situation. Fellow club members are also a good source of used equipment.

Amateur radio dealers often take trade-ins on new equipment. Rigs bought from dealers have usually been serviced, and often carry a limited warranty. Expect to pay more for the radio of your choice from this source, however.

Last on the list is classified ads and flea markets. Excellent equipment can always be found, often at reasonable prices. However, let the buyer beware! Radios from these sources are most often purchased at face value, and an unwary buyer can end up with a "basket case."

Check it Out!

If at all possible, try the radio out and verify that it operates properly. Remove the covers and look for signs of damage or modifications. In short, make sure the condition of the chassis matches that of the cabinet. If you are new to ham radio, ask a more knowledgeable ham to help you evaluate the radio.

Buying the Rig

Like any other significant purchase, make sure the buyer and seller agree on the terms of the sale. It's best to put everything in writing, to protect both parties. Such items as price, warranty, known defects, and accessories included should be listed. Both the seller and buyer should keep a copy.

Wrapping Up

A final suggestion: If you're just getting started, buy an older radio. Your investment will be lower, and the radio will be easier to operate. You can easily recoup most of your investment when you trade up to another radio.

Getting the worldwide HF bands doesn't have to cost a small fortune! Using these guidelines, just about anyone can get on HF, regardless of budget limitations. RF

Contact Michael A. Forhan WB8RNB at 116 North Route 560, Urbana OH 43078.

Manufacturer	Model	Bands	WARC Bands	Operating Modes	SSB Input Power	All Transistor	Digital Display	Power Supply	Price Class
Alda	103	80-20	No	CW/SSB	250W	Yes	No	DC	$225
Astro	200A	80-10	No	CW/SSB	200W	Yes	Yes	DC	$475
Atlas	210x	80-10	No	CW/SSB	200W	Yes	Opt	DC	$350
Atlas	215x	160-15	No	CW/SSB	200W	Yes	Opt	DC	$350
Atlas	350-XL	160-10	No	CW/SSB	350W	Yes	Opt	DC	$450
Collins	KWM-2A	80-10	No	CW/SSB	175W	No	No	AC	$500
Drake	TR-4x	80-10	No	AM/CW/SSB	300W	No	No	AC	$350
Drake	TR-7	160-10	No	CW/SSB	250W	Yes	Opt	DC	$600
Heathkit	HW-7/8/9	80-15	Opt(9)	CW	3.5W	Yes	No	DC	$135
Heathkit	HW-101	80-10	No	CW/SSB	180W	No	No	AC	$225
Heathkit	SB-102	80-10	No	CW/SSB	180W	No	No	AC	$250
Heathkit	SB-104	80-10	No	CW/SSB	100W	Yes	Yes	DC	$325
Hy-Gain	3750	160-10	No	CW/SSB	200W	No	Yes	AC	$700
ICOM	IC-701	160-10	No	CW/SSB	100W	Yes	Yes	DC	$650
ICOM	IC-720	160-10	Yes	AM/CW/FSK/SSB	100W	Yes	Yes	DC	$350
ICOM	IC-735	160-10	Yes	AM/CW/FM/SSB	200W	Yes	Yes	DC	$675
ICOM	IC-745	160-10	Yes	AM/CW/FM/FSK/SSB	200W	Yes	Yes	DC	$425
ICOM	IC-751	160-10	Yes	AM/CW/FM/FSK/SSB	200W	Yes	Yes	DC	$700
Kenwood	TS-120S	80-10	No	CW/SSB	200W	Yes	Yes	DC	$350
Kenwood	TS-130S	80-10	Yes	CW/SSB	200W	Yes	Yes	DC	$450
Kenwood	TS-180S	160-10	Yes	CW/SSB	200W	Yes	Yes	DC	$375
Kenwood	TS-430S	160-10	Yes	AM/CW/FM/SSB	250W	Yes	Yes	DC	$700
Kenwood	TS-520S	160-10	No	CW/SSB	200W	No	Opt	AC	$350
Kenwood	TS-530SP	160-10	Yes	CW/SSB	220W	No	Yes	AC	$400
Kenwood	TS-820S	160-10	No	CW/SSB	200W	No	Opt	AC	$475
Kenwood	TS-830S	160-10	Yes	CW/SSB	220W	No	Yes	AC	$650
Henry Radio	Tempo One	80-10	No	CW/SSB	250W	No	No	AC	$275
Swan	100MX	80-10	No	CW/SSB	235W	Yes	Opt	DC	$400
Swan	350B	80-10	No	CW/SSB	300W	No	No	AC	$300
Swan	350D	80-10	No	CW/SSB	300W	No	Yes	AC	$325
Ten-Tec	509	80-10	No	CW/SSB	5W	Yes	No	DC	$250
Ten-Tec	540	80-10	No	CW/SSB	200W	Yes	Opt	DC	$300
Ten-Tec	544	80-10	No	CW/SSB	200W	Yes	Yes	DC	$400
Ten-Tec	545	160-10	Yes	CW/SSB	200W	Yes	No	DC	$425
Ten-Tec	546	160-10	Yes	CW/SSB	200W	Yes	Yes	DC	$475
Ten-Tec	570	80-10	No	CW	70W	Yes	Opt	AC	$175
Ten-Tec	574	80-10	No	CW	70W	Yes	Yes	AC	$225
Yaesu	FT-101	160-10	No	AM/CW/SSB	260W	No	Opt	AC	$300
Yaesu	FT-301	160-10	No	AM/CW/FSK/SSB	200W	Yes	Opt	DC	$350
Yaesu	FT-757GX	160-10	Yes	AM/CW/FSK/SSB	100W	Yes	Yes	DC	$625
Yaesu	FT-901	160-10	No	AM/CW/FSK/SSB	180W	No	Yes	AC	$650

Notes:

1. Power ratings usually indicate PEP input for SSB mode. However, rating methods vary between manufacturers.
2. Some models indicate WARC band capability, but were built prior to allocation of the new bands to hams. These radios may require additional optional components to operate on the WARC bands.
3. Prices listed are typical for the used HF radio market. Actual prices may vary widely based on the condition on the radio and options installed.
4. All solid-state models usually require and external 12 volt DC supply. Tube-type radios often require specialized high-voltage AC supplies. When buying a tube-type radio, make sure the power supply is included.

New Jersey Changes Scanner Law

New Jersey has changed its law regarding the possession of radios in motor vehicles. On Monday, January 20, Governor James Florio signed New Jersey law S-305, superseding a law that had been on the books since 1926. Under S-305, it no longer is a crime for private citizens, including radio amateurs, to have in their vehicles a radio capable of scanning governmental frequencies. Efforts to change the law were spearheaded by members of the ARRL volunteer field organization.

Under the old law, it was illegal for amateurs to carry in their cars VHF or UHF ham transceivers capable of tuning to police and fire frequencies near the ham bands. Even transporting a scanner radio by car from a retail store to one's home technically was a crime. The new law still makes it a criminal offense to use such a radio to gather information for the commission of a crime. Possession of such a radio at the time of arrest for a crime is considered de facto evidence of its use in the commission of the crime. The new law does not apply to simple traffic infractions such as speeding.

New Jersey law S-305 was drafted by ARRL Volunteer Counsel Frank Terranella N2IGO. Other amateurs aiding in its presentation were Volunteer Counsel John Norton N2IOB and ARRL Hudson Division Assistant Director John Burgio W2JB. Hudson Division Director Steve Mendelsohn WA2DHF, Assistant Director Ken Hampton KY2S, Mt. Olive (NJ) Councilman Bill Sohl K2UNK, NNJ Section Manager Rich Moseson NW2L, and former SNJ SM Rich Baier WA2HEB also contributed to the successful campaign. *TNX to Luck Hurder KY1T, via "The Parking Ticket," February, 1992.*

Dayton Hamvention Forums

Friday, April 24

International Hungarian Amateur Radio Club
Packet Radio
Development Tools for the Engineer
Antennas
Electrical Safety Demonstration
Ham Radio in the Classroom
Preamp/Converter Noise Figure Measurements
Collins User Group
QRP

Saturday, April 25

DX
ARES
Weather Satellite
Combined MARS
UHF/VHF
Electrical Safety Demonstration
CSSBN
Youth in Amateur Radio
Ohio ARMY MARS
Digital Digest
Slow Scan TV
Firebirds
Wayne Green W2NSD/1
Contests
SPAM (Society for the Protection of Amplitude Modulation)
Red Cross (Disaster Communications)
Amateur TV (Fast Scan TV)
Repeater Coordination
ANARC
QRP
10-10
SWL
FCC
"Nets: Getting the Most from Yours"
Recruiting New Hams

Sunday, April 26

Bicycle Mobile Hams of America
Antenna Tuners
Electrical Safety Demonstration
ARRL
Supergain Antennas
Amateur Radio and the Law
Station Grounding for Lightning Protection
HF Operating Techniques for the New and Inexperienced Ham
VHF/UHF Antenna Gain Measurements

Voltsentry

Monitor your power supply.

by James Elkins Jr. KA8PHO

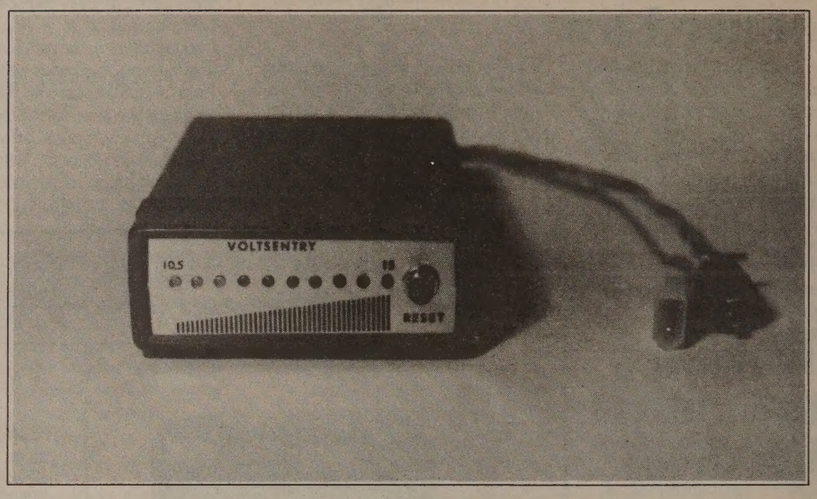


Photo A. The front panel of the Voltsentry.

If you've ever wondered if the voltage output from your power supply would shut down if it became unregulated, or if you've ever wanted to keep an eye on it without having to watch a small meter, this project will interest you. I call it the "Voltsentry" because it does just that. Whenever you have it connected to your power supply, it will guard against any overvoltage condition, thereby protecting your equipment. It will alert you with an audible alarm, or if you wish, it can switch a relay, cutting off the power to your equipment. You can also look at the LED display at any given time and be able to tell what the voltage is by which LED is illuminated. And, the accuracy will be within a half a volt over the range of 10.5 to 15 volts.

You can easily set high and low limits, at which voltage the alarm will go off if the voltage drops below the determined level or above a voltage upper limit, using a DIP type switch (see Figure 1). Voltage points in the middle range were omitted as this would be an optimum level for the power supply to be running at (12.5 to 13.5 volts).

Looking at the schematic, you will notice that the circuit uses readily available parts, and is pretty straightforward in design. It is actually a combination of three circuits that are all very useful. The LM3914 is a bar graph display driver used as the "meter" part of the circuit. It will do the actual measuring for you with the help of voltage dividers R13 and R14, then display this voltage on one of 10 LEDs: three yellow, indicating 10.5 to 11.5 volts; four green, indicating 12.0 to 13.5 volts; and the three red, indicating 14 to 15 volts. Outputs from the LM3914, lettered A-H, go to our DIP switch, where we select our alarm levels. You will only want to select one from A-D, and one from E-H. A-D are your low level selects, while E-H are your high level selects. One from each group goes to an input on the inverter, then on to our output. Q1 and Q2 are used to drive our piezobuzzer and relay. A small DIP-type is used, wired to form a latching type so that once the alarm goes off it will hold the circuit externally in, until it's reset with push-button S2.

The external relay, a DPDT type, should have ample current ratings for the contacts, especially if you use the Voltsentry to monitor the output of the main power supply going to your heavy current drawing devices (amplifiers, HF rig, etc.). You can wire contacts in parallel to accomplish this and keep the cost of the relay down, as you will be using only the positive side of the output line. This relay can be mounted in close to the output terminals, and the wires can go to a convenient location for setting the enclosure housing the display. The entire circuit (excluding the external relay) is assembled and wired on a perfboard available at Radio Shack

Some point-to-point wiring will be necessary using this method, as shown in the photos. Power for the project can be borrowed from the same supply it is monitoring, as it is brought in and regulated to 5 volts.

Once the project is wired, leave all the DIP switches in the off position. You should have +5 volts at pin 3 of U1 (LM3914). Using a high impedance voltmeter or DVM, set R13 for approximately 2.45 volts at pin 5. This will set the high limit. Next, set R14 for approximately 3.45 volts on pins 6 and 7. This will set the low limit. You will note some interaction between the two pots, but with a little patience you will find the correct settings. The display should light only one LED at a time and depending what the voltage is, the corresponding LED on the display will be illuminated.

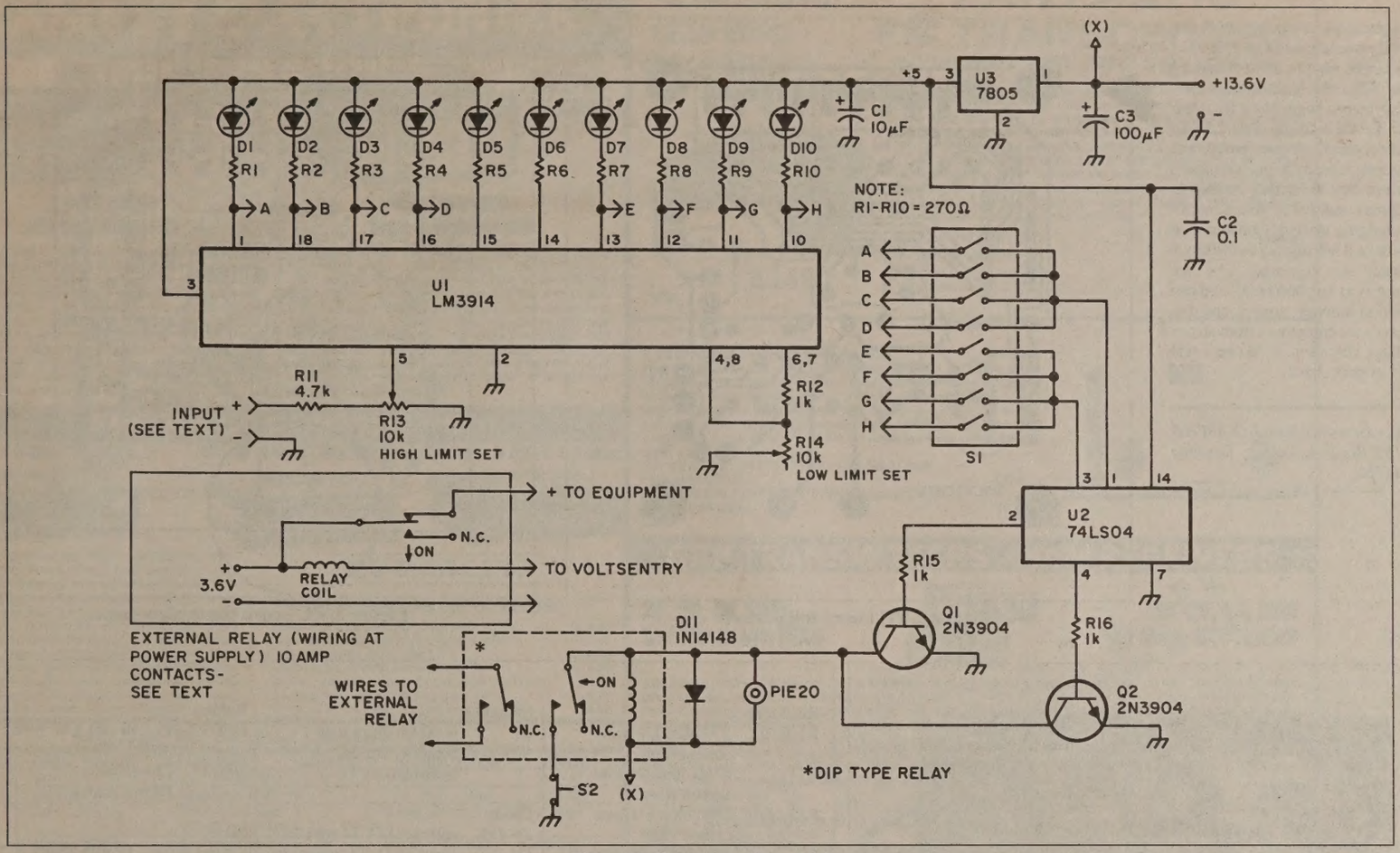


Figure 1. Voltsentry Schematic

Sometimes a variable supply that will vary over the range of 10.5 to 15 volts can be used to make things go easier. After the Voltsentry is calibrated you can begin using it in your shack. Set the high and low limit DIP switches, one from each group, and everything is ready to go. You could even use the Voltsentry mobile to check the condition of your automobile charging system. Connected to the battery, it will display the battery's voltage. As you can tell, the Voltsentry is very versatile, and can be used to monitor, protect, and disconnect your equipment from an overvoltage condition. It can be a real friend in your shack. RF

Contact James W. Elkins Jr. KA8PHO at 3185 Brady Lake Rd., Ravenna OH 44266.

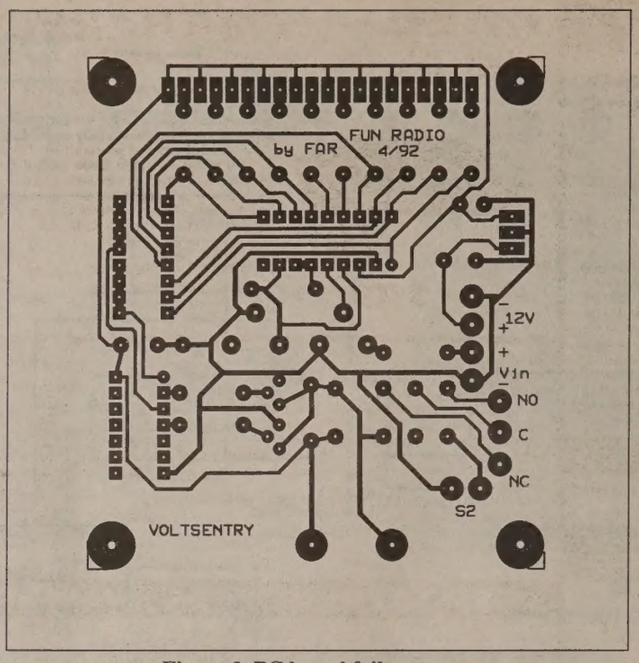


Figure 2. PC board foil pattern.

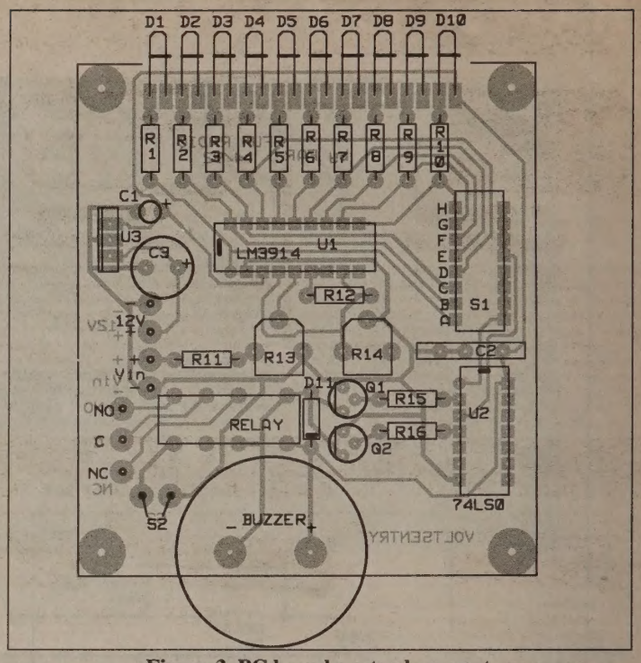


Figure 3. PC board parts placement.

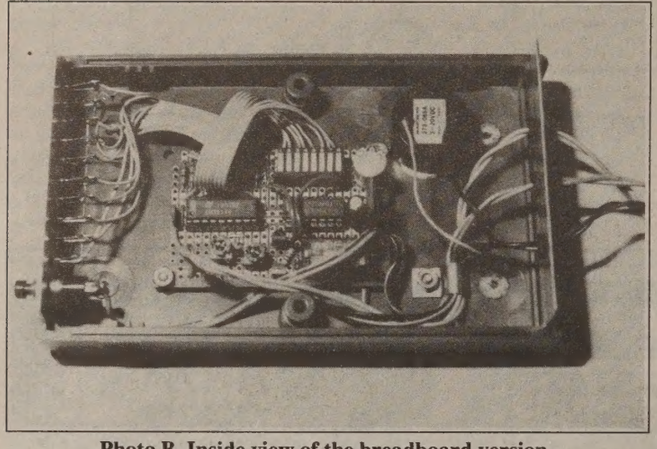


Photo B. Inside view of the breadboard version.

Resistors

R1-R10	270 ohm 1/4 watt carbon film
R11	4700 ohm 1/4 watt carbon film
R12,15,16	1000 ohm 1/4 watt carbon film
R13,14	10k ohm potentiometer (Radio Shack #271-282)

Capacitors

C1	10 µF 10 volt electrolytic
C2	0.1 µF 25 volt disc ceramic
C3	100 µF 25 volt electrolytic

Semiconductors

Q1	2N3904
Q2	2N3904

Switches

S1	8-switch dipswitch
S2	normally closed, push-button type

Diodes

D1-D3	yellow LED, T1 type used
D4-D7	green LED, T1 type used
D8-D10	red LED, T1 type used
D11	1N4148

ICs

U1	LM3914 bar graph display driver
U2	74LS04 hex inverter
U3	7805 5-volt regulator

Relays

DPDT	12-volt coil, DIP type (RS#275-249)
DPDT	12-volt coil, 10 amp contacts

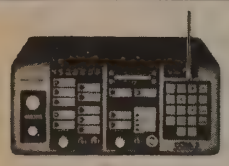
Misc.

Piezo Buzzer (Radio Shack #273-065A or 273-074)

18-pin and 14-pin IC sockets, labels, enclosure, perfboard (Radio Shack #276-150)

Note: An etched and drilled PC board is available for $4.50 + $1.50 shipping per order from FAR Circuits, 18N640 Field Court, Dundee, IL 60118.

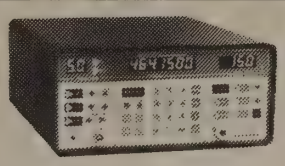
RAMSEY ELECTRONICS



COM-3 $279.00

2 WAY RADIO SERVICE MONITOR

COM-3, the world's most popular low-cost service monitor. For shops big or small, the COM-3 delivers advanced capabilities for a fantatic price—and our new lease program allows you to own a COM-3 for less than $3.00 a day. Features •Direct entry keyboard with programmable memory •Audio & transmitter frequency counter •LED bar graph frequency/error deviation display •0.1–10.000 µV output levels •High receive sensitivity, less than 5 µV •100 kHz to 999.9995 MHz •Continuous frequency coverage •Transmit protection, up to 100 watts •CTS tone encoder, 1 kHz and external modulation.



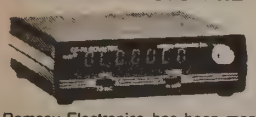
RSG-10 $249.00

SYNTHESIZED SIGNAL GENERATOR

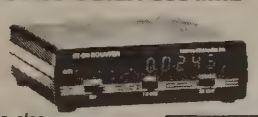
Finally, a low-cost lab quality signal generator—a true alternative to the $7,000 generators. The RSG-10 is a hard working, but easy to use generator ideal for the lab as well as for production test. Lease it for less than $3.00 a day. Features •100 kHz to 999 MHz •100 Hz resolution to 500 MHz, 200 Hz above • −130 to +10 dBm output range •0.1 dB output resolution •AM and FM modulation •20 programmable memories •Output selection in volts, dB, dBm with instant conversion between units •RF output reverse power protected •LED display of all parameters—no analog guesswork!

FREQUENCY COUNTERS

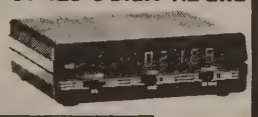
CT-70 7 DIGIT 525 MHz



CT-90 9 DIGIT 600 MHz



CT-125 9 DIGIT 1.2 GHz



Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for its lab quality products at breakthrough prices. All of our counters carry a full one-year warranty on parts and labor. We take great pride in being the largest manufacturer of low-cost counters in the entire U.S.A. Compare specifications. Our counters are full-featured, from audio to UHF, with FET high impedance input, proper wave shaping circuitry, and durable high quality epoxy glass plated-thru PC board construction. All units are 100% manufactured in the U.S.A. All counters feature 1.0 ppm accuracy.

NEW CT-250 2.5 GHZ

ACCESSORIES FOR COUNTERS

Telescopic ship antenna—BNC plug, WA-10	$11.95
High impedance probe, light loading, HP-1	$16.95
Low-pass probe, audio use, LP-1	$16.95
Direct probe, general purpose use, DC-1	$16.95
Tilt bail, elevates counter for easy viewing, TB-70	$ 9.95
Rechargeable internal battery pack, BP-4	$ 8.95
CT-90 oven timebase, 0.1 ppm accuracy, OV-1	59.95

ALL COUNTERS ARE FULLY WIRED & TESTED

MODEL	FREQ. RANGE	SENSITIVITY	DIGITS	RESOLUTION	PRICE
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CT-125	10 Hz–1.25 GHz	<25mV to 50 MHz <15 mV to 500 MHz <100 mV to 1 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$189.95
CT-250	10 Hz–2.5 GHz typically 3.0 GHz	<25 mV to 50 MHz <10 mV to 1 GHz <50 mV to 2.5 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$249.95
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NEW

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Matching case set for SRI, CSR $12.95
Matching case set for SCI,CSC $12.95

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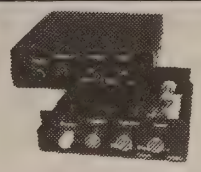

Keep an ear on the local repeater gang, monitor the cops, check out the weather or just plain listen around. These sensitive superhet receivers are just the ticket. They tune any 5 MHz portion of the band and have smooth varactor tuning, dual conversion with ceramic IF filters, AFC, adjustable squelch and plenty of speaker volume. Runs on 9V battery and performance that rivals the big rigs! For a complete finished pro look, add our matching case and knob set with screened graphics.
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RF vintage review

The IC-735 HF Transceiver

by Marc Stern WA1R (ex - N1BLH)

If there's a rig on the market which proves that "good things come in small packages," it's the ICOM IC-735, the successor to the IC-730. At 9" x 9" x 4" and 15 pounds, this 100-watt HF transceiver is loaded with just about any feature an operator could want. As you would expect, CW and SSB are standard, but so are AM and FM, and it is a general-coverage receiver as well.

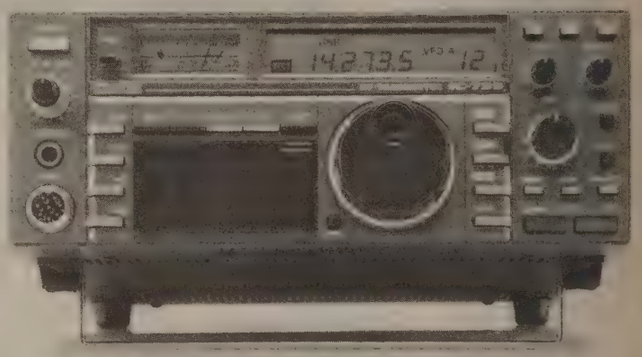
Among its other features are dual VFOs, 12 memories, passband tuning, notch filtering, a built-in 10 dB preamplifier, and a green liquid-crystal display which indicates frequency, mode, VFO selection, and memory.

With as many features as it has, you would think that the IC-735 would be confusing to operate. After all, there are 44 switches and knobs on the front panel—you have to admit that that number is quite high. But, after using the rig for a few minutes, the controls quickly become second nature. In fact, the labeling is so clear that you are never left wondering what a switch will do. For example, you know that ATT cuts in the attenuator, and PRE AMP activates the preamplifier.

In fact, during the time I used the IC-735, I had few problems with it at all. Most of my operating was casual—a CW contact here and a phone rag-chew there. In this type of service, I found the rig much more than adequate. I would suspect that the combination of notch and passband tuning, the 20 dB attenuator, and the 500-Hz CW filter will make this a good basis for a contest station.

There is one proviso to this, though: In the presence of strong signals the IC-735 tended to pump, as if there was too much AGC. I don't think the AGC was the problem because I had adjusted everything according to the instruction manual. What I think was happening was that the front end of the receiver was becoming overloaded in the presence of many strong signals, and this forced the rig to pump. Flipping on the attenuator, as well as the narrow CW filter, alleviated much of this problem.

All things considered, this is a fairly minor shortcoming in an otherwise excellent piece of equipment. In fact, you can easily work around it with the existing controls. It's just that you should be aware it's there up front, rather than suspecting something is wrong and crating the rig back to the factory, when, in fact, there is no problem.



The ICOM IC-735

Features

For most operators, though, the IC-735 should be more than enough transceiver. With its features and microprocessor control, there is very little the IC-735 can't do. For example, it is possible to select and program up to 12 frequencies in the rig's memories. You can then select and use a memory frequency for the basis of your operation, or you can choose one of the two VFOs. The memories will not only hold the frequency you've selected, but also the mode you've chosen.

An interesting sidelight is the IC-735's automatic choice of the correct sideband operating position, USB above 10 MHz and LSB below. This is in agreement with international convention and it makes this rig more convenient to operate. However, if you run into a situation where you must change the sideband position—RTTY, for instance—you can easily do this by touching the SSB key and the mode will change.

One of the nicer features of the IC-735 I reviewed was its built-in electronic keyer (optional). Although you can't change the dot-dash weighting of the keyer—it's set for 3 to 1—most operators will be more than happy with the CW keyer capability of the rig.

The keyer's speed can be varied from about 10 to about 45 wpm, and while I suspect an ardent contester may want a keyer with more functionality, most casual operators should find the electronic keyer more than adequate.

One feature which I especially liked was the IC-735's full CW break-in. Simply pushing the BK IN switch (located behind a smoky plastic cover) allowed me to have full break-in, which was nice during several CW QSOs. It does take some playing with to become used to the slide adjustment for the keyer's speed, but once you've found a setting that you're comfortable with, you can set it and forget it.

Another particularly nice feature on this rig was the narrow (500 Hz) CW filter (another optional item). The CW filter enabled me to fine-tune any CW signal and eliminate just about all QRM, unless, of course, the QRM was right on top of the signal I was trying to copy. The notch and passband tuning features allowed me to vary the width of the passband to help null out QRN and QRM. When this filtering is combined with the CW filtering, I found it possible to eliminate any trace of interference to the signal I was listening to.

As I used the IC-735, I came to appreciate the work ICOM has done on it. For example, the shaping of the CW signal was the way I like it. The waveform was clean and its rise and decay times produced a clean signal. There was no chirping or ringing which would have indicated a waveform which was too soft or too sharp.

You must use a stereo phone plug to install a paddle so you can use the electronic keyer. You can also disable it by pushing the electronic keyer on-off switch. When this is disabled, you can use either a straight key or an external keyer. The CW jack is in the rear.

Through all the testing and use I

gave the IC-735 throughout the review period, I found the output to be a stable 100 watts in all modes but AM. With the rig in the AM setting, power output was 40 watts. ICOM rates this rig at 200 watts input power, but a truer measure was my wattmeter, which showed a 100-watt output. This means you can use the IC-735 to drive just about any amplifier to the legal limit. At the same time, the IC-735 can serve as a QRP rig because the power output is adjustable from about 10 watts to 100 watts. The control for this is located behind a plastic protective covering.

This rig was equipped with an HM-12 scanning hand microphone. This mike has up and down buttons so you can scan up through the rig's memories or through a range of frequencies and then scan back down through them again. Audio reports from other stations indicated that the rig's SSB and FM audio were very good.

The power control and the others—VOX, VOX gain, anti-VOX, RF gain, ALC, CW and AM filters, CW break-in, and electronic keyer—have been grouped in a central area, which is a new idea for ICOM. These lesser-used controls are grouped into one area where they are easily accessible. However, once you've set them, you can close the panel and forget them. It certainly cleans up the front control panel of the IC-735 and leaves only the necessary controls in plain sight.

Operating Notes

After looking at other ICOM transceivers recently, I can say I like the design of the IC-735. It has everything that is standard on other ICOM HF transceivers—plus AM and FM—but in a cleaner, less cluttered, less confusing package. About the only thing I could detect that has changed between the various ICOM rigs is the lack of an XIT control, which I feel, after using the IC-735 for some time, would be a convenience, but it isn't a necessity.

On the rear panel there's the usual complement of jacks and connectors including the CW jack, an external speaker jack, ALC-Send jacks for use with an amplifier, a transverter jack, and a jack for a separate receive antenna. There are also two accessory jacks which you use to set the rig up for RTTY, among other things, and there's a special serial port through which you can interface a personal computer directly with the IC-735's microprocessor.

One of the biggest changes you'll note in the IC-735 is the lack of a heat sink for the final amplifier. Instead of using a heavy heat sink, ICOM has used a squirrel-cage fan which goes on as soon as you hit the transmit switch. At first, the sound this fan makes is barely perceptible, but, after a few minutes of high-power or continuous-duty operation, the fan automatically increases speed and this becomes noticeable. I found it somewhat distracting. Yes, it was nice to know this cooling capacity was there for the finals, but the rig didn't have to let me know quite so loudly.

According to ICOM, the IC-735 sports a newly developed central processor which gives this unit added flexibility. For example, the memory scan allows monitoring of all different memory channels or only those stored with a particular mode. Programmed scan provides scanning between any two programmed frequencies. Auto-stop scan functions when a signal is received in any mode, while mode-selective scan automatically monitors only those memories which contain frequencies with a similar mode.

This capability, though, does have a drawback, which has been pointed out in many articles and publications in the recent past: The micro-coding which drives the central processor is stored in battery-backed RAM. Driven by a five-year lithium battery, the RAM is retained as long as power is applied to it. If the power is lost—a premature battery failure or some other problem—then the programming is gone and you'll have to send this rig back to the factory for reprogramming. ICOM would do well to consider using nonvolatile RAM or PROM storage for the micro-code, at least.

Still, this shouldn't deter the average operator from looking at this rig. It's a pleasure to use. Major controls are grouped according to their functions. For example, the mode-select switches—CW, AM, FM, SSB—are all to the left of the protective panel. The noise blanker (whose duration can be set), attenuator, preamplifier, automatic gain control, and speech compressor are all grouped just below the display, to the left of the tuning knob. The turning controls—kHz, MHz, ham, and scan—are to the right of the tuning knob, and the RIT, notch, and passband controls are to the right of them. The memory and VFO selectors are also in this section.

Using the ham control will allow you to move quickly through the ham bands, while the kHz control allows you to QSY quickly up a frequency range. The MHz control, as its name implies, moves from one frequency range to another in 1-MHz chunks.

One thing you should be aware of when using the RIT control is the fact that the frequency on the display doesn't change as you use it. When the red RIT LED is lit, you can move + or - 800 kHz. This capability isn't as wide as some rigs I've used in the past, but it is more than reasonable.

Of more importance to me are the notch filtering and passband tuning. With the notch filter alone you can introduce nearly 30 dB of filtering, and the ability to narrow the passband of the receiver is important when you are trying to copy one station out of many. The preamplifier is of benefit here, too, although I suspect it raised the noise floor enough to not only increase the signal of the weak station I was trying to copy, but also the noise level, and so it almost canceled the station out.

Design

The IC-735 is a full-featured, compact HF transceiver. The transmitter covers all the WARC bands (10, 18, and 24 MHz). The general-coverage receiver features continuous 100 kHz to 30 MHz tuning. It has a 105 dB dynamic range with a 70.4515 MHz first IF circuit. This circuit is able to eliminate nearly all spurious responses because it was designed around two high-quality crystal filters.

Using a direct-feed mixer, ICOM has engineered a rig with a higher spurious-response rejection ration, higher receiver sensitivity, and a wider dynamic range. The DFM circuit feeds incoming signals directly into the high-level first-mixer stage.

After the first IF stage, signals are downconverted twice: first to 9.0115 MHz and then to the standard 455 kHz. The rig remains rock stable at all times. Our testing is pretty much in agreement with the published stability figures for the IC-735—less than 200 Hz drift one minute after turning it on, less than 30 Hz after an hour, and less than 500 Hz over the temperature range of 0 degrees to 50 degrees C.

That the IC-735 is a quality rig is easily seen from its specifications. For example, with the preamp on, its SSB/CW sensitivity is less than 1.0 µV for 10 dB S/N from 0.1 to 1.6 MHz. From 1.6 to 30 MHz, it's less than 0.15 µV for 10 dB S/N. In AM mode, using the narrow filter, its sensitivty is less than 6 µV for 10 dB S/N from 0.1 to 1.6 MHz and less than 1 µV for 10 dB S/N from 1.6 to 30 MHz. FM sensitivity from 1.6 to 30 MHz is less than 0.5 µV for 12 dB Sinad. Squelch sensitivity is 0.3 µV on FM. Selectivity is also good.

Spurious and image-response rejection is greater than 80 dB and notch-filter attenuation is greater than 30 dB.

On the transmit side, harmonic output was more than 40 dB below peak power output and spurious output was more than 50 dB below peak power output. Carrier suppression was more than 40 dB below peak power output and sideband suppression was better than 50 dB down.

Overall, the IC-735 is a good rig. It seems to represent a new direction for ICOM: new microprocessor, new micro-code, new display, and smaller packaging. The trend it represents is a trend toward simplicity and ease of use. It easily achieves those aims and it turns in excellent performance to boot.

Finally, its instruction book is fairly complete, although some of the writing could be improved. It presents you with a description of all of the salient features of the rig, some theory, and some nice cutaways of the rig, as well as a huge, but very detailed, schematic. I think the manual could be more comprehensive, especially in the theory of operation area. But, most operators should find the documentation more than adequate.

Editor's Note: This transceiver is still part of ICOM's current line-up. You can find it at many ham stores, or look for one on the used market.

Reprinted from the November '85 issue of 73 Amateur Radio.

DXing From (Almost) the North Pole

by Daryl Gerke KØFBF

Andy Warhol said that "the day will come when everyone will be famous for 15 minutes." To paraphrase the famous artist, "every ham should be DX once for 15 minutes . . ." And so it was on my visit to Prudhoe Bay, Alaska, in the dead of winter 1989.

If you've never been on the other end of a pile-up, believe me, it's a thrill, even for the most casual DXer.

My Visit North

As a consulting engineer, I've visited some interesting and unique places (HL and 9K2 among others) but never had the chance to do any DX hamming. The foreign trips usually do not provide enough lead time to take care of the paperwork. On the positive side, I've had some very enjoyable "eyeball QSOs" with these DX hams.

In this case, I was invited to teach eight days of technical classes for ARCO, one of the oil companies based at the wellhead of the Alaska pipeline. Several of the attendees were hams, and I was asked if I'd like to do some hamming from the club station.

It had been a number of years since I'd been active on HF, but it sounded like fun. Little did I know how much fun, and later on, how much it was going to cost, as the old radio bug bit once again.

Prudhoe Bay

Prudhoe Bay is located on the Arctic Ocean, on the north side of Alaska. At approximately 70 degrees north, it is about 250 miles north of the Arctic Circle, and less than 1,300 miles from the North Pole. A quick look at a polar map shows that only parts of Greenland and Siberia are farther north

Prudhoe Bay marks the beginning of the Alaska oil pipeline. Discovered in the mid-1970s, the fields at Prudhoe Bay are the largest in North America. At this time, they are over half gone, a sobering thought for anyone who believes the oil will last forever.

In November, the temperatures at Prudhoe Bay can range from a balmy 10 to 20 degrees Fahrenheit above zero, to 40 degrees or more below zero. In January or February it can drop to 70 degrees below zero, with a wind chill factor of over 100 degrees below zero. Perfect antenna weather, right? I guess I was lucky, as it only dropped to 35 below zero, which made this Minnesota ham feel almost at home.

Several thousand personnel work at the ARCO facilities at Prudhoe Bay. Many are electronic engineers and technicians, since the process of pumping, monitoring, and measuring oil are highly computerized. Due to the remote location, most personnel work 12-hour days, one week on and one week off. Many live in Anchorage or Fairbanks, but some commute to Washington, Oregon, California, and even Hawaii. (Talk about thermal shock!)

The Ham Station at Prudhoe Bay

It's natural that there should be a few hams in this group. And where there are hams, there will be a ham station or two, right?

The station I operated was located in the communications facility for ARCO. Purchased as a "backup emergency communications system," the system has to be checked regularly, of course, to see if worldwide communications is still possible.

The equipment is first-class. The main rig is a Kenwood 830 coupled to a Henry amplifier, with assorted accessories. The antennas are equally impressive—two elements on 40 and seven elements on 10/15/20, both at about 75 feet. The Arctic Ocean is less than a mile away, and there are no trees or mountains for 60 miles. (How many of us can claim no antenna obstructions for 60 miles?)

The location is first-class, too. Even though KL7 is part of the US, it counts as a separate country. And although it's not rare, it is still quite desirable, as I found out later. By the way, county hunters, Prudhoe Bay is in that hard-to-catch "Northwestern County."

On the Air

As mentioned earlier, it had been awhile since I'd been really active. My old tube-type transceiver and vertical antenna were not exactly made for breaking pile-ups. As a result, I wasn't sure just what to expect from this station.

Due to my innocence, my host for the evening, Denis NL7R, had some fun with me. After giving me a quick overview of the station and tuning up the Henry amp, he suggested a quick CQ. Back came an SM5, and we had a nice rag-chew. So far, so good.

Then, the SM5 cut it short, suggesting that a "few others would probably like to work you." After we signed, it was pandemonium—a real pile-up, only I was the one being chased. After getting over the shock, we started to work them as fast as we could. Denis ran the log, while I gave out the reports. What a thrill!

Almost as quickly as it began, it was over, as the band just collapsed. Due to the extreme northern location and only about three hours of daylight in mid-November, the propagation was very different from the "lower 48." Or as another host, Don AL7KD, put it, "The laws of physics change when you cross the Arctic Circle."

The next night, band conditions were poor. A recent solar flare was to blame, but as a result I did get to see some spectacular Aurora displays. Later in the week we hit another streak, but nothing like the first time.

Back Home Again

First of all, the radio bug had bitten again, like it had 30 years before. As a result of that, and promises of skeds with my new Alaskan friends, the shack was updated. At first it was just a new solid-state rig, but by spring the station included a triband beam, tower, and small linear. With this station I can work quite a bit of DX—but it's still hard to beat the thrill of being on the other end of a pile-up.

There is a moral here, too. You don't need to pack a station with you if you want to operate DX. If there are local hams, or a club, you'll be welcomed. In fact, for many of the rarer locations, being DX may even wear thin. My Alaskan friends pointed this out, and they were happy to have someone else work the pile-ups for a change. Best of all, you'll make some new friends—one of the best reasons I can think of for being a ham in the first place.

Finally, if you hear Prudhoe Bay, give them a call and ask them about the weather. That "polar flutter" you hear may just be the operator shivering a bit. And if you are a KH6, try not to rub it in too much.

Special thanks to AL7KD (Don Giles) for the photographs, and to AL7KD and NL7R (Denis Allen) for acting as my station hosts. And thanks to the many stations I worked as KØFBF/KL7—even today QSLs still arrive via the bureau. RF

Contact Daryl Gerke KØFBF at 1544 North Pascal, St. Paul MN 55108.

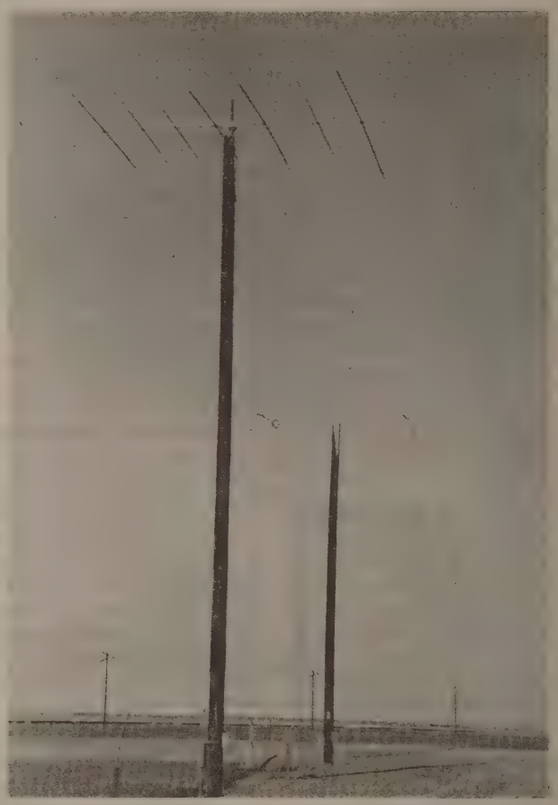


Photo C. Beam antennas at Prudhoe Bay.

Photo A. ARCO Communications Center. Note buildings on pilings above ground, so they won't sink into the tundra because of building heat.

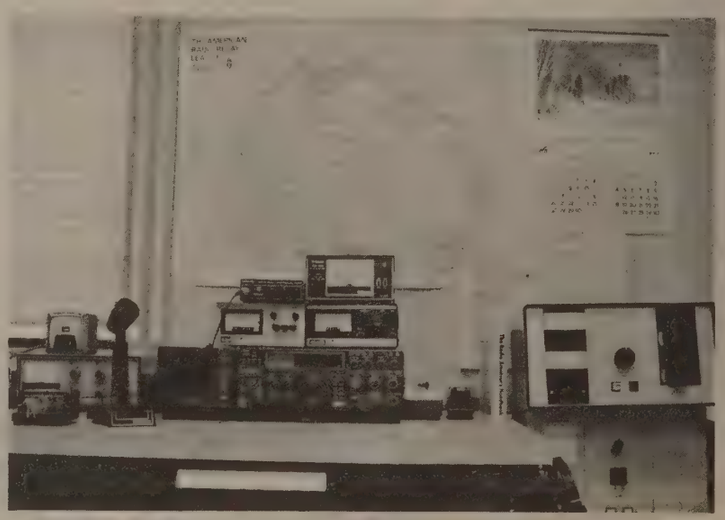


Photo B. The ham station at Prudhoe Bay.

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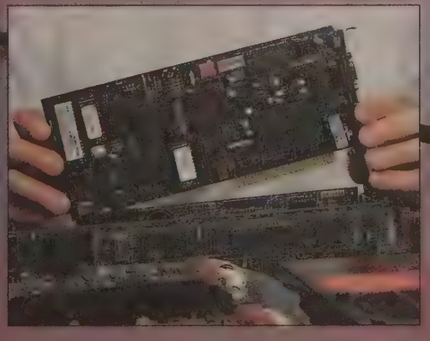
Now you don't.

Psst! It's in here!



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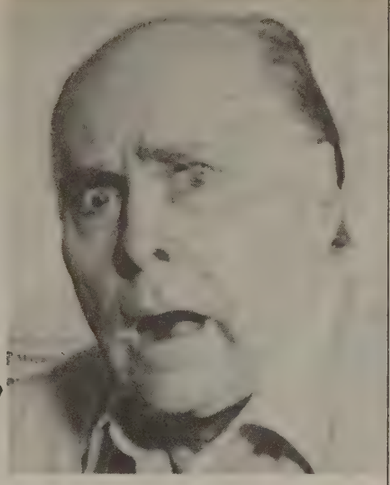

10,000 smart and thrifty amateur radio enthusiasts have subscribed to *Radio Fun* over the past year. They've been enjoying all of the news, reviews, construction projects and all the other great articles in *Radio Fun* – delivered right to their door every month.

If you've been putting off subscibing to *Radio Fun*, then you'd better hurry. The price of a one-year subscription is going up. This is the last issue that will offer the remarkably generous price of $9.97. If you wait 'till next month, it'll cost you $12.97 — and three bucks is three bucks, right?

Of course, if you'd like to do us a favor, please do *not* subscribe to *Radio Fun* today. Wait 'till next month, and send us $12.97 — still a great price. We'll send you 12 issues of the magazine, and we'll put your extra three bucks toward a good cause — like the "Official Fund to Buy New Gear For the *Radio Fun* Staff" or maybe a donation to the "Annual *Radio Fun* Summer Picnic and Tractor Pull Fund."

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try something new

by Bill Brown WB8ELK

Mini-Voice Transmitter

Last month we featured a mini-QRP CW transmitter for the Novice band on 10 meters using an inexpensive crystal clock module of the type used in many home computers. This 40 milliwatt wonder is capable of establishing contacts around the world under the right conditions.

This month we'll add the power of speech to the mini-transmitter. With the addition of just a few inexpensive components, you'll have a really small AM voice transmitter that'll fit in the palm of your hand. Don't expect to break through massive pileups, but this transmitter is powerful enough to reliably send a signal over several miles between local stations. If band conditions are good, you may even be able to talk to stations around the country or even the world.

Use it as a super test signal for your workbench or house it in a small Radio Shack enclosure with a 9-volt battery and you'll have a transmit-only HT. If you hook up a 47 or 51 ohm resistor across the antenna output, it can be heard around the house (over a hundred feet away) without the need for an external antenna (makes a great little bug!).

How it Works

If you refer to the schematic in Figure 2, let's follow the signal through the transmitter from the microphone to the antenna. Your voice is converted into a small 100 millivolt (peak-to-peak) signal by the electret microphone. This is too small a level to modulate the oscillator circuit, so you need to amplify this low-level signal up to about 1-volt (peak-to-peak) using a 741 op-amp integrated circuit. This higher level voice signal feeds through capacitor C2 into a two-transistor AM modulator which controls the amplitude output of the crystal oscillator module. The value of capacitor C2 can vary from 1.0 µF to 47 µF. You can get away with lower values for standard voice communications, but you'll find the higher value capacitor gives you higher-fidelity sound reproduction.

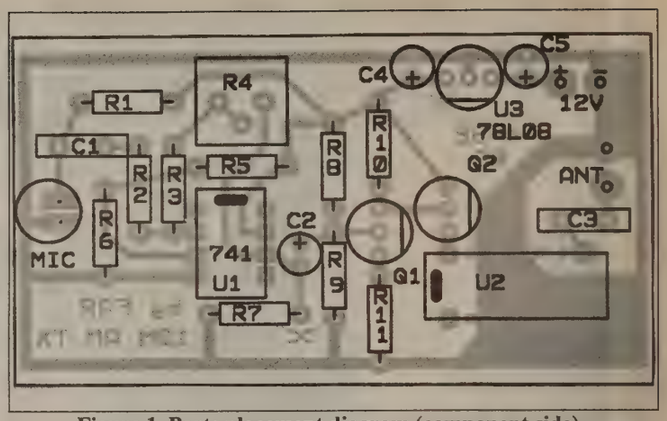


Figure 1. Parts placement diagram (component side).

Why AM?

Amplitude Modulation (AM) is one of the earliest methods used to convey voice information by radio. You voice is decoded by the receiving station based on the amplitude (strength) of the components of your signal. Imposing a voice signal on a steady carrier (such as a CW transmitter) causes information sidebands on either side of the center carrier. For example, if you feed a 1 kHz signal into your AM transmitter, you would see a center carrier (the crystal oscillator frequency) and two sidebands 1 kHz on either side of the carrier. Most shortwave stations use AM for their broadcasts since the receivers are generally simple to build and can be made inexpensively. Also the ease of tuning in the station as well as the fidelity of the transmission makes this mode especially well suited for broadcasting of music and programming. There are two drawbacks, however. AM is susceptible to static crashes and fading and it occupies a larger spectrum than a SSB transmission. Some time ago, a move to convert over to Single Sideband (SSB) was implemented in order to alleviate the crowding problem on the ham bands. A SSB transmitter removes one of the sidebands and suppresses the center carrier leaving just one voice information sideband. Since more of your transmitter's power goes into the one sideband, its more efficient. You do have to be more careful how you tune your receiver (the Donald Duck syndrome).

Tune Up and Operation

AM is still used today in portions of the ham bands. On the ten meter band you can usually find a good deal of activity just above 29 MHz. Although our oscillator module is on 28.322 MHz in the middle of the Novice band (mostly SSB stations), I doubt if a 40 milliwatt AM transmitter is going to bother any nearby stations!

I used AM modulation for this project due to the relative ease of construction. All of the filtering and processing to put out a SSB signal would increase the complexity of this circuit considerably. One nice side advantage of using AM is that you can listen to your transmitter with inexpensive shortwave receivers (the kind that can't receive CW or SSB).

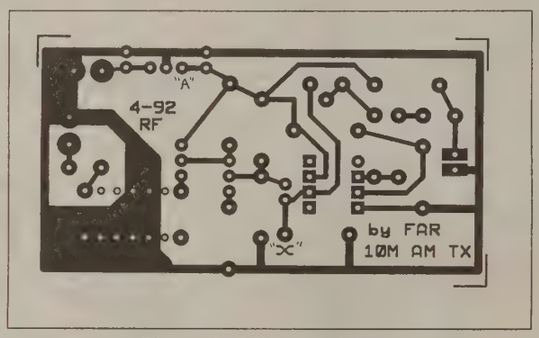


Figure 3: PC Board foil pattern.

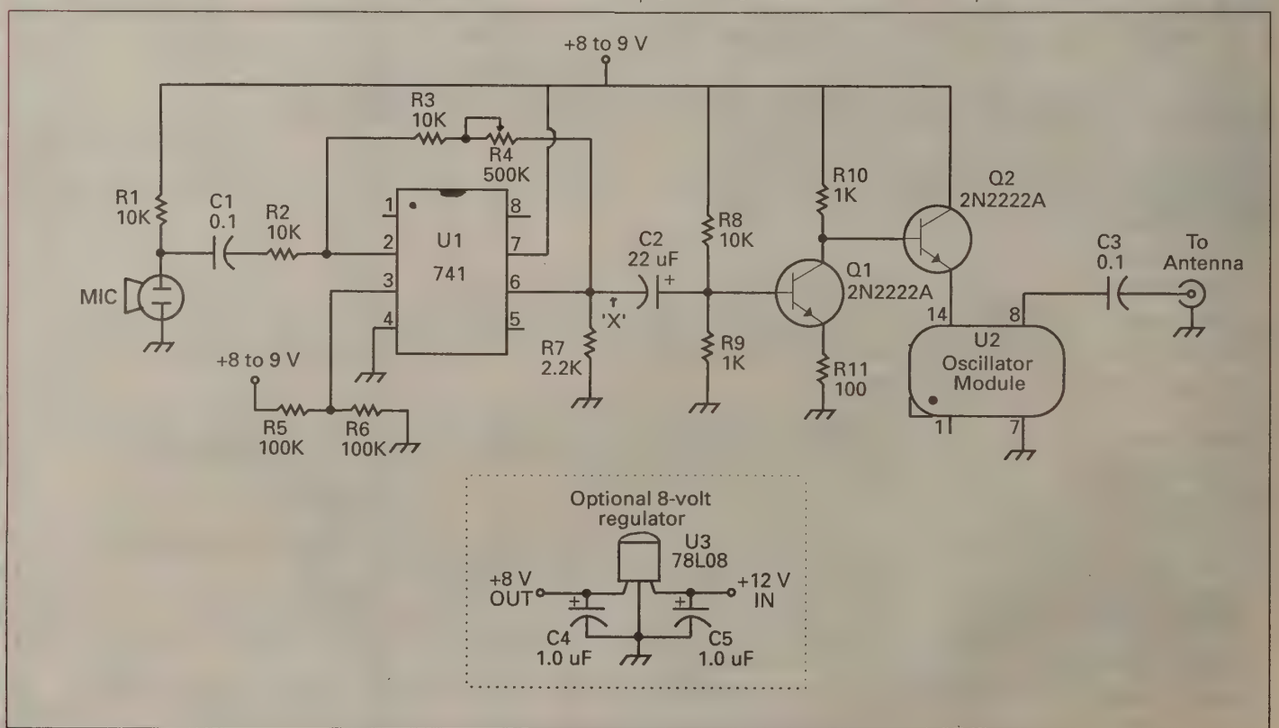


Figure 2. Schematic diagram of the mini-voice transmitter.

Parts List

R1,R2,R3,R8	10k resistor (Digi-Key# 10KQ)
R4	500k potentiometer (Digi-Key# 3386P-504-ND)
R5,R6	100k resistor (Digi-Key# 100KQ)
R7	2.2k resistor (Digi-Key# 2.2KQ)
R9,R10	1k resistor (Digi-Key# 1KQ)
R11	100 ohm (Digi-Key# 100Q)
C1,C3	0.1 µF capacitor (Digi-Key# P4525)
C2	22 µF or 47 µF tantalum capacitor (Digi-Key# P2040 or P2042)
C4,C5	1.0 µF tantalum capacitor (optional - Digi-Key# P2059)
U1	741 op-amp IC (Digi-Key# LM741CN or Radio Shack# 276-007)
U2	28.322 MHz oscillator module (Digi-Key# CTX128)
U3	78L08 8-volt voltage regulator (optional - Digi-Key# AN78L08)
Q1,Q2	2N2222 or 2N2222A NPN transistors (Digi-Key# PN2222A)
MIC	Electret microphone (Radio Shack# 270-090 or Digi-Key# P9949)
Misc	14-pin IC socket (Digi-Key# ED3314), 8-pin IC socket (Digi-Key# ED3308), transmitter case (Radio Shack# 270-293).

Note: A blank PC board is available for $3 + $1.50 shipping from FAR Circuits, 18N640 Field Court, Dundee IL 60118. A complete kit including the PC board and an oscillator module on 28.322 MHz is available for $39 + $3 shipping from Smith Enterprises, 408 Mauna Loa, Glendora CA 91470. (818) 963-0079.

Just follow the parts placement diagram in Figure 1 to build your own mini-transmitter. Take notice of the flat side of transistors Q1, Q2 and U3 (the voltage regulator). Pin 1 of the 741 op-amp integrated circuit is indicated by a dot next to the pin and a groove at the top end of the IC. Pin 1 of the oscillator module is indicated by a dot and a sharp pointed corner on the metal can. Also make sure to take note of the polarity of tantalum capacitors C2, C4 and C5. Also the electret microphone needs to be installed as shown.

You can solder the crystal oscillator module directly to the PC board if you don't plan to change frequencies or install a 14-pin IC socket to allow you to easily swap modules for different frequencies.

Tune-up of the completed circuit is very easy. Just apply power and tune in 28.322 MHz on your receiver. If you can't receive AM, tune in the signal on USB (upper sideband). Zero-beat the carrier, and adjust potentiometer R4 for the best quality sound (no distortion or clipping). You're now ready to talk to the world!

NOTE: If you use the 8-volt regulator (U3 - 78L08), you can operate the transmitter from a 12-volt supply. If you want to operate with a 9-volt battery, don't install regulator U3 (the 78L08) and capacitors C4 and C5. Then just hook up the positive lead of a 9-volt battery clip to point "A" (the output pad of the voltage regulator - see Figure 3). If you want to feed in a high level audio source (1 volt p-p), you can eliminate the audio amplifier section to the left of capacitor C2 on the schematic. In this case attach your audio source to capacitor C2 at the point marked "X" on the PC board (Figures 3).

This circuit will operate on any ham frequency band if you can find the appropriate oscillator module. Browse through the Digi-Key catalog (phone 800-344-4539) to see if any of these modules will work for you. You can also custom order the frequency of your choice from Cal Crystal Labs, Inc., 1142 N. Gilbert, Anaheim CA 92801; (714) 991-1580. A blank circuit board is available for $3 + $1.50 shipping per order from FAR Circuits, 18N640 Field Court, Dundee IL 60118. A complete kit including a module for 28.322 MHz and the PC board is available for $39 plus $3 shipping from Smith Enterprises, 408 Mauna Loa, Glendora CA 91470. (818) 963-0079. RF

upgrade . . . don't stop now

by Gordon West WB6NOA

Yikes! I Studied the Wrong Material!

Finally, you made it all the way through your study book. You have put a check mark beside the easy questions, and circled those questions that required a little more investigation. You then went back, studied the harder questions, and now everything seems to make sense, and it's time for the big upgrade written exam. As you close your textbook, you glance at something that catches your eye in the upper right-hand corner—"TEST QUESTIONS VALID THROUGH FALL 1991."

Yikes! You somehow got an older book, and were studying test questions that presumably would be changed the first of this year. Oh my gosh—all that studying, for nothing.

No worry. General class Element 3B questions, Advanced class Element 4A questions, and Extra class Element 4B questions haven't changed over the past couple of years, and they remain valid for the next couple of years. Even if you had a very old General, Advanced, or Extra textbook published prior to 1987, 98 percent of the questions and their four right and wrong possible answers remain absolutely identical to today's tests.

Same thing for the Novice Element 2 and Technician class Element 3A questions—if your book has a copyright date of 1987 through the present, the test questions will probably be almost identical to what you have been looking over.

So if you have been reading an older study book, don't panic—even the question and answer theory guides two and three years old are right on target for your upcoming upgrade examination.

"But they are going to change most of the numbers, volts, amps, and ohms in the test questions from what is in the book, aren't they?" is a comment we receive a lot here at Radio School. The answer is, "Absolutely not." By FCC order, not a single number, letter, comma, or question mark may be changed on your written examination from what you have been studying out of your Q & A textbook. The volunteer examiners MUST use the precise question, exactly as it is worded in your test guides. You'll probably find the A, B, C, D answers in the same order, too! While a volunteer examination team could be allowed to change the right and wrong answers, I'm not aware of any team throughout the country that does. The right and wrong answers on the examination will agree with what you have been using as a Q & A study guide.

So don't let me hear anyone coming out of the test room claiming that there were test questions on the examination that were absolutely not in the latest edition of their reference Q & A manuals. That just won't happen. If an examiner wants to wager a bet that the test they gave you was straight out of your Q & A book, you better not bet much money that the examiner is wrong. What's on the test is, word for word, what's on your Q & A study guides. No surprises—no secret questions—the questions and answers on your exam are straight out of your textbook.

For Your Spanish Friends

Spanish language Element 2 Novice theory and Element 3 Technician theory Q & A license manuals are now available from Ray Cardenas WW6X, 1158 W. 28th Street, Los Angeles CA 90007, for $24.95.

Ray is not a volunteer examiner since he works for Henry Radio in Los Angeles. However, that does not preclude him from serving his Mexican and Spanish friends by coming out with not only Q & A test manuals that are bilingual, but also bilingual examinations for any two General class hams, or above, wanting to give a Novice test in Spanish, or examinations that are bilingual for any VE team wanting to have a set on hand. He used a sophisticated computer program to generate these examinations, and no two exams are the same. Now Ray doesn't give the tests himself—since he works for Henry Radio, he may only publish his training materials as well as produce bilingual examinations for anyone who may wish to use them. Since he has an Extra class license, he may take part in the preparation of question sets.

Bilingual examinations are handy down in Southern California and San Diego, Texas, Arizona, and Florida. Is there a rule that states the examination must given only in English? There's a rule that says we can't change the actual wording of the test questions, and indeed his bilingual Q & A book, plus his examinations, are word-for-word out of the FCC syllabus. But under each sentence is a Spanish translation, also word-for-word. Some VECs say they won't use them—others say they'll come up with their own translation—and other VE teams are gladly accepting the written examinations as an alternative to turning away a Spanish operator who doesn't read English well.

If you know a Spanish amigo who is having a hard time reading over the Q & A material, or a hard time taking that entry-level Novice examination in English, you might want to contact Ray to see all that is available.

Novice and Tech Questions to Change Next Year

Novice Element 2 and Technician class Element 3A examination questions will all change about a year from now, on July 1, 1993. Not this July, July 1993. I'll say it again—1993, not this July.

The Question Pool Committee (QPC) is working to down "grade" the readability of the questions for Novice and Technician. Novice questions will be written at the 7th grade level, and Technician class questions will be written at the high school level. Grammar experts have analyzed our present Novice and Technician class questions, and they are at the Ph.D. level in many cases!

You, too, still have time to submit your proposed junior high and high school level Novice and Tech questions to the Question Pool Committee. Keep your proposed question and four possible answers down to approximately 250 total letters or less. Tell me which question this is replacing, or where this question may be used for Novice or Technician. You must send them directly to me at my *Callbook* address (WB6NOA), and I will type them up and get them out on computer to Bart at the ARRL, Ray Adams down South, and Fred Maia in Texas.

The Novice and Technician class questions for next year will also be renumbered. The simplified question numbering system will make it easier for you to study for an upgrade. The Novice and Technician class tests will also have fewer schematic diagrams and fewer symbols, and this is an important consideration for the many visually-impaired students preparing for their tests. This will give the testers more opportunities to select questions that don't require the applicant to actually see schematics or symbols.

The total number of questions for next year's Novice and Technician class tests will remain about the same—10 times the number of questions for the actual number of examination questions. If there are 30 questions on the Novice exam, this means it will come out of a pool of 300 or more possible test questions. So get back and hit the books for your theory upgrade. What you have been studying is probably more than up-to-date—and even if it is rather old reference material, changes are it's almost identical to what your test will be like. If you're really concerned, go out and buy a brand-new textbook that covers all the questions and answers. For less that $10, you can get a good night's sleep before the big exam knowing that what you have been studying will be identical to what's on your upcoming upgrade exam.

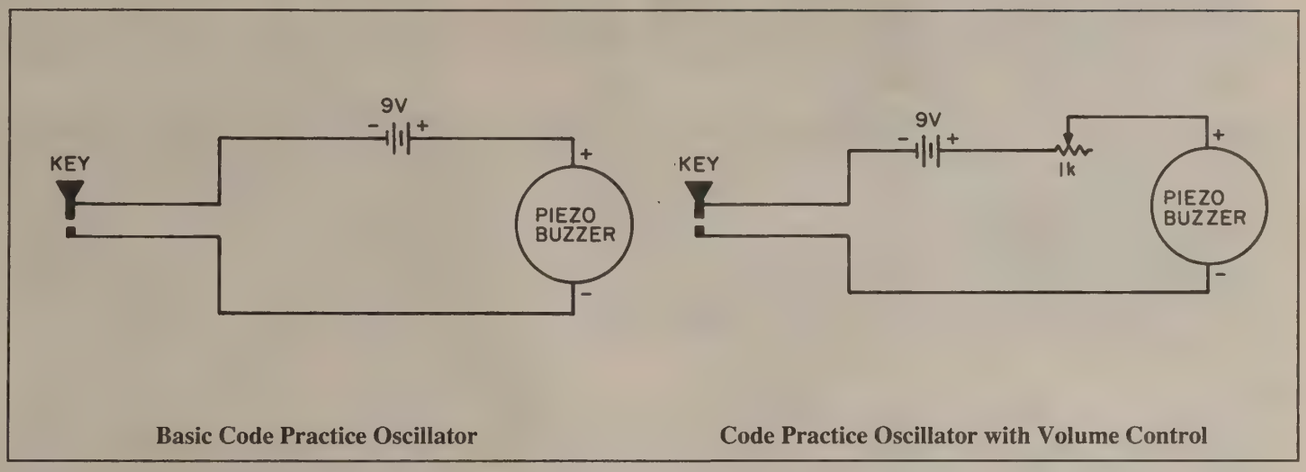
Good luck! RF

Another upgrade! "The test questions were exactly what I studied," states WH6AC (left).

Tremendously Simple Code Practice Oscillator

By Phil Salas AD5X

Lots of people have published simple code oscillator circuits using transistor or IC oscillators. However, a very simple and effective code practice oscillator can be made with a Radio Shack 273-065 piezo buzzer ($2.49). This is a 2800 Hz 3-20 VDC oscillator with +78 dB sound level at 12 volts. I built mine on a piece of wood with a 9 volt battery holder and a key. Just hook everything in series. The key is the on/off switch. This oscillator only draws about 10 milliamps, so you can even put a 1k potentiometer in series with the battery to give you a volume control. This piezo buzzer costs about what you'd have to pay just for the speaker you would normally need with a transistor or IC oscillator. RF



Basic Code Practice Oscillator — **Code Practice Oscillator with Volume Control**

The Japanese Dayton: Harumi Ham Fair

by Frank L. Striegl 7J1AAL/KA2TNZ

Every year, on the last weekend in August, there is an extensive ham fair held in Tokyo. All major Japanese equipment manufacturers, plus local amateur organizations and clubs, and even the ARRL, get into the act for Asia's largest ham fair. Attendance for 1990 reached a record high of 59,000 hams and ham fans, and 1991 figures smashed that record with 60,000 in attendance.

This year's ham fair was as exciting as the previous 14 ones, held annually since 1977. In spite of rather humid August weather, visitors from 17 different countries attended, including BV, BY, HL, OH, UA, W, ZA, and others. The ham fair also had in attendance such dignitaries as Richard Baldwin W1RU, President of the International Amateur Radio Union (IARU), and Shozo Hara JA1AN, President of the Japan Amateur Radio League (JARL).

For the past several years, the JARL and Japanese MPT have used the Harumi Ham Fair as an occasion to publicize newsworthy ham events. In 1985, for instance, W-JA reciprocity was announced at the Fair. This year, the big announcement was that ZA would become active after some 40 years. Present were several dignitaries from the Albanian P.T.T., and it was announced that ZA would be active starting in September. Many hams had long waited for this country to be activated, and were elated at the news. JARL had donated the lion's share of the equipment for start-up of a permanent ZA operation.

There is an Event Corner, where foreign and DX ham personalities are invited to give scheduled talks on interesting topics. This year famous DXer Martti Laine OH2BH, gave a talk on some of his DXpeditions. In years past, guests have included Jim Smith VK9NS and XYL Kirsti, among others.

The Tokyo International Amateur Radio Association, TIARA, [author is a past president] has had a booth at Harumi for many years, and offers the visiting DX ham a chance to meet and chat with other foreign hams. TIARA is the only English-speaking international amateur radio club in Tokyo, and probably the only one of its kind in Japan. Harumi visitors such as famous Tim Chen BV2A/B and many others from 9V1, DU, W, VK, LU, and other areas have all stopped by the TIARA booth.

In addition to seeing all the newest equipment on display, visitors to the Fair can find bargains in used rigs, faxes, and just good old parts at many of the club exhibits. Although there is no tailgating at Harumi, there are lots of opportunities to buy used equipment. Many JA clubs offer sales of used rigs or other ham gear. There is also a wealth of odds and ends available, such as used minifaxes for $40, oscilloscopes available for a range of prices, etc. Of course, circuit boards and the like are always around for you to look over—maybe you'd be able to find what you're looking for to use in that next project in the shack. In recent years, the Fair has become rather large, and it now takes up half of the second floor of the huge exhibition hall, as well as all of the first floor! You could easily spend a day there, or maybe two.

If you are a licensed national of one of the "lucky five" countries that JA has concluded reciprocal operating agreements with (W, VE, VK, F, G), then you can apply for a 7J license before you arrive in JA, and have the privilege of operating the Fair station, 8J1HAM. This year, some 500 ops QSOd with almost 10,000 stations, both JA and DX, on several bands. 8J1HAM always has the latest equipment available, and this is a great opportunity to have a chance to "test-drive" that new rig you have been ogling.

Speaking of ogling, don't forget to go through the equipment exhibits. There are usually some YLs on hand to help explain how the equipment works. And it's always interesting to eye the rare QSL cards, antique radios, and home-brew equipment on display as well.

All the major ham gear manufacturers, and many smaller ones, too, have booths at Harumi to show off the latest models of their rigs, power supplies, antennas, etc. Equipment exhibitors will entice you with brochures about their products. English brochures are also available from several of the larger companies. Although you can't buy the latest model antenna or rig at the companies' booths, there are shops which come in from Akihabara or other parts of

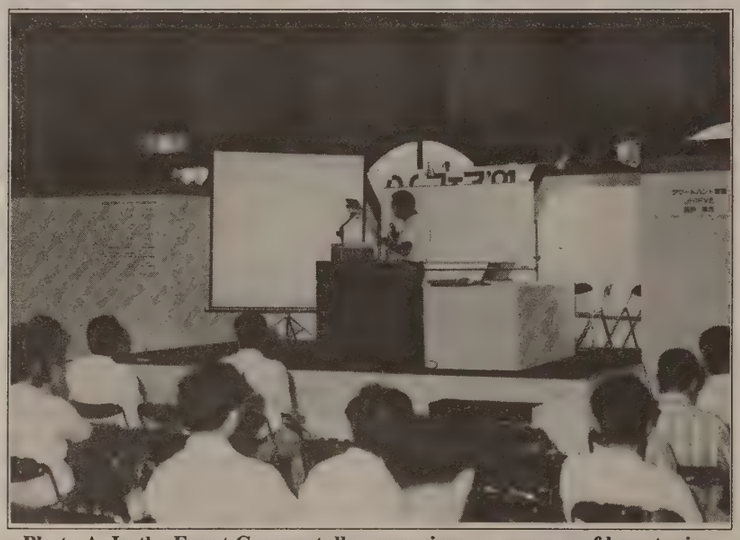


Photo A. In the Event Corner, talks were given on a range of ham topics.

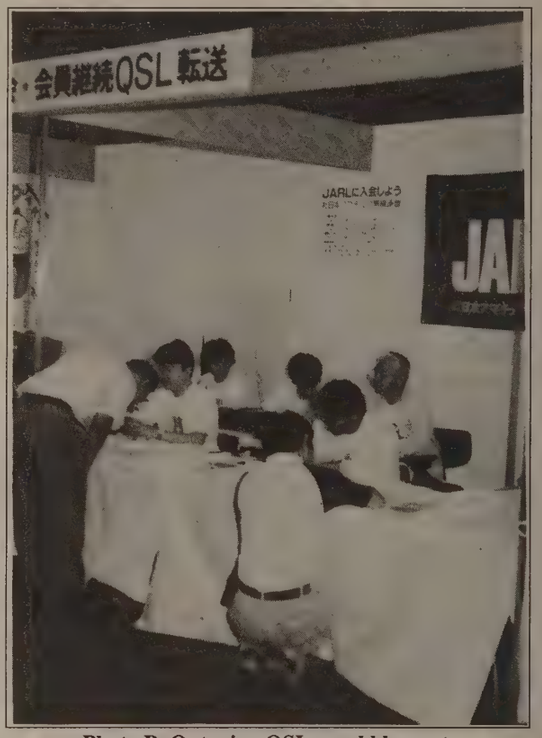


Photo B. Outgoing QSLs could be sent from the JARL QSL booth.

Photo C. Japan Ladies Radio Society (JLRS) always has a good showing at the fair.

Photo D. Several operating positions at 8J1HAM.

Photo E. The SeaNet booth is always well-staffed. JAØAD, Kobayashi-san, is a mainstay here.

Photo F. Club booths area.

Japan to set up and sell for the three days of the fair. They offer bargains (especially on the last day) on antennas, accessories of all kinds, and new and used rigs. I was able to get a good buy on a mobile HF rig (IC-721) at the fair this way.

If you live in JA, outgoing QSL cards can be dropped at Harumi as well, at the "JARL Corner." This year, some 1,600 pounds of outgoing QSLs were gathered at the Fair. Many hams were very glad to see Naoki Akiyama N1CIX/JH1VRQ from the ARRL back this year, to check DXCC QSLs and generally offer a pleasant chat in his free moments.

There are also QSL printing companies. You can order your QSL or eyeball cards right at the fair and receive them at home within a week or so. Callsign badges, hats, and other ham paraphernalia are also readily available.

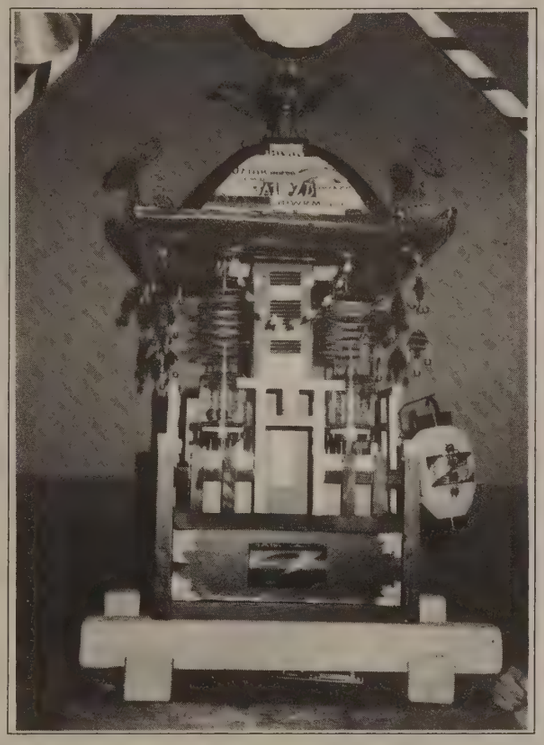


Photo G. A high-tech Japanese shrine.

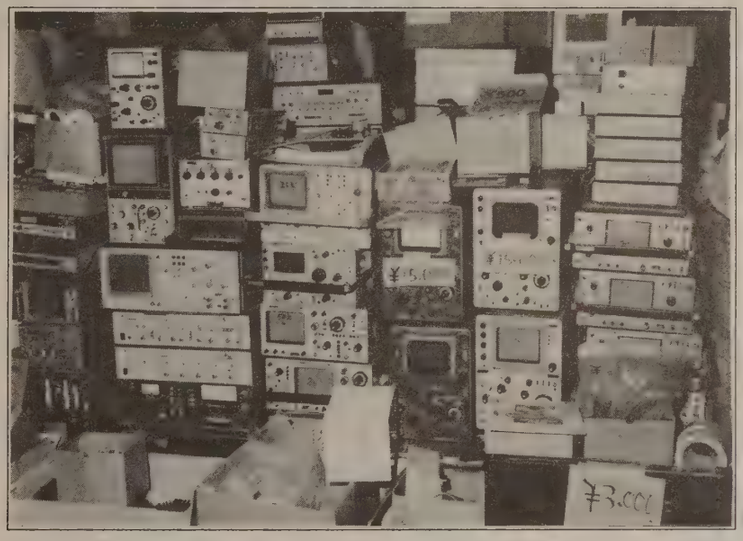


Photo H. Scope this out!

All in all, if you can get to Tokyo the third weekend in August, Harumi is well worth the trip. You will be rewarded with wonderful memories of your trip, and all the various things you will get to see at the Fair will be unforgettable. If you would like information about the dates for the next Ham Fair, contact me at my *Callbook* address, or better yet, contact the JARL/International Section.

Oh, yes—trust the JAs to think of every perfect detail—there is a bank right outside the Harumi exhibition area. See you next August at Harumi? 73s de 7J1AAL. **RF**

Information for this article provided courtesy of the Japan Amateur Radio League and Jay Oka JA1TRC, head of the JARL's International Section. The author has attended Harumi Hamfests for nine years. Contact Frank L. Striegl 7J1AAL/KA2TNZ at 4-39-7-503 Kaminoge, Setagaya-ku, Tokyo 158, Japan.

Photo I. JARL President Shozo Hara JA1AN addresses the JARL Eyeball QSO Party.

Photo J. Flagging down the customers.

radio magic

by Michael Bryce WB8VGE

Old, Old Radios II

Last month, we were trying to find out what was wrong with the broadcast radio I picked up at a hamfest. To catch up a bit, we found that by taking some simple voltage checks we were able to tell that the power supply was being loaded down by something. Also, by using a pair of 2,000 ohm headphones and a capacitor, we were able to hear the audio coming from the final audio tube in the set. But why won't the radio play for us? This is where we'll pick up from last month.

Sometimes the best thing to do is to simply think out the possibilities. We know the plate supply is way too low for the radio to operate. We also know something is loading the plate supply down because the filter choke/speaker electromagnet is overheating. We know the radio is working, sort of, so nothing in the IF or RF stages of the radio are affected. There's no audio coming from the speaker, or any other noise either, for that matter. So, think before you reach for another piece of test gear.

Remember the old saying about a chain being only as strong as its weakest link? Well, this story holds true here. Whatever is loading down the plate supply is dissipating its power better than the filter/choke speaker electromagnet. This same part is the weak link in the power supply chain because it's the one that's overheating. So, what ever the problem, it's not going to be a small part like a resistor causing the low plate voltage. A resistor would reveal itself by smoking and burning up. Nope, this is something physically large enough to carry a large amount of current and still stay in one piece.

Well then, how about a shorted tube? That sounds like a very good idea, and thanks in part to the tubes being in sockets, we can check this hunch out. Remember, if I had a good tube tester, we would not have to do these steps. However, a tube tester is not 100 percent correct all the time. Sometimes you need to sub out a suspect tube with a known good tube. Again, we know that the rest of the radio seems to be working, and since we have no audio, let's check the audio output tube first.

The audio power tube is a 6F6. To check for a simple plate short, power up the radio and watch the tube in a darkened room. A shorted tube may arc inside or, if the tube is drawing too much current, the plate will turn a deep cherry red color. If you ever come across this problem in the future, check for a shorted cathode capacitor or out-of-spec cathode resistor (turning the tube full on), or lack of bias in a class A or B amplifier. Lack of bias will cause the tube to conduct, overheating the plate in the process.

The 6F6 does none of these things, but that doesn't mean that there isn't a problem. We just can't physically see anything wrong with the tube. Turn the set off for now.

Finding the Problem

Let the tubes cool down so you can remove the suspect tube from its socket. Now that the tube is out of the circuit, if the short is gone and the plate supply comes back up to something normal, we do in fact have a shorted tube. With the suspect tube of the circuit, connect up the VOM to read the plate voltage and fire up the set. In my case, the plate supply remains low with the 6F6 out of its socket. Seems like the shorted tube

idea was a blowout. We'll now have to dig a bit deeper inside the radio to find the problem once and for all.

So back down inside we go, looking for things that just don't look right. I had replaced all of the leaky paper capacitors before I did anything else to the radio. I did not get them all as some of them looked just fine. This radio has been fixed before; I can tell that some of the parts have been replaced. To make matters even more difficult for me, some of the repairs look rather messy. Black cloth tape was used to cover solder splices in some instances. The cloth tape dries outs, exposing the connections. With the power off, and leaving time for the power supply capacitors to discharge, I rechecked the repaired connections, resoldered them and rewrapped them with heat-sink tape. Some of the solder connections on the the tube sockets looked kinda so-so, so I resoldered all of them. I was drawing straws here.

At this point I still believed the problem to be around the audio section of the receiver, so that is where I spent most of my time looking for trouble. Using the digital VOM, I took readings on all of the pins of the 6F6 audio tube. I flipped the radio over to get a better look at the circuit, and saw something I had missed. There is a tone control mounted on the front panel. I knew this, but never gave it much thought. But there were three paper capacitors connected to the tone switch and then to the audio tube. Again using the digital VOM, I started looking. Don't you know it, one of the capacitors from the tone switch was showing DC voltage on both sides of the capacitor. Remember, capacitors don't pass DC, only AC, so here was the culprit! It turned out to be a 0.01 capacitor connected to the audio tube and the tone switch. I replaced all three capacitors connected to this circuit. As it turned out, I could have just left the capacitors out of the circuit, but then the tone control would not have worked. To keep the radio original (as best as I could), I went ahead and replaced everything. Also, since the capacitor that was leaky looked really good, I went ahead and replaced ALL of the paper capacitors in the radio.

Looking back, I should have suspected all of the capacitors and just gone ahead and replaced them all before I did anything else. A lot of times, this just is not possible to do.

As you can see, the use of the autoranging digital VOM really makes looking for trouble easy, with no switching the range switch back and forth. It's too bad I don't have a good tube tester for working on these old radios. Perhaps I'll bring one back from the next hamfest I go to. Maybe I'll pick up some tubes to keep on hand, too.

Even though the radio I was working on was not a ham transceiver, the ideas in this column can be of use for all manner of troubleshooting. Just remember to watch what you're doing when working on a radio using tubes. There are lots of lethal voltages lurking deep down inside the chassis. Aside from the deadly voltages, things do run a bit hotter inside a tube radio. BE CAREFUL!

As you can see, you can fix a broken radio without an electronics test lab. Use common sense and just think your way through the trouble. Sure, there will be times when you do need a shop full of test gear, but most of us can fix what we own without trouble using nothing more than some simple voltage checks. As we get further down the road, we'll use some other cheap and simple tests and test gear to fix a broken radio.

Next month, I'll have some info on building your own work bench to work on these boat anchor radios. RF

letters *(continued from page 5)*

Martin Luna N7PWL, Cheyenne WY *Radio Fun* is the amateur magazine I have looked for. The information is great, and the technical aspects just right.

I was re-reading the December 1991 issue, as I do with the others quite often, and came across a small article titled "Secondary Ham Communications." I agree that there is room in the hobby for other types of communications. I have read part 97 many times, and . . . like all laws, it is a matter of interpretation. I do not agree, however, that "ordering pizza via autopatch" is a great idea, nor do I agree that we should open up to any communication remotely associated with business. But what about not-for-profit business?

I am an advisor to an Emergency Services Explorer Post. It is a brand-new post, and I plan to introduce amateur radio to these youths as a method of communications—an alternative to public safety radio. This would be a type of "third" communications, with which you could conduct business not only locally, but worldwide, with others involved in Exploring Emergency Services.

Any other ES Explorer Posts out there? I would like to hear about your program, especially if you use amateur radio.

Martin - Amateur radio is used daily for emergency communications. As long as you're not conducting business over the air (and, in emergencies, there are some exemptions to this) you're OK. Why do we need a re-wording of the rules to do something we're already allowed to do?

Does anyone out there have an Explorer or Scout group having fun with amateur radio? Write about how you organized it, and about all the fun you're having! Then send it in! – David N1GPH

Don Skinner KA3TQQ, Matamoras PA I read that you have too many advertisements. Don't you believe it; keep it all coming. This paper, *Radio Fun*, is better than any magazine I get, and I get them all.

I wish this was a weekly. You-all are doing a super job. This is one "rag" I'll never give up.

Don - You can never have too many advertisers. The advertisers who support Radio Fun *are the ones who care about the newcomer – and the future of amateur radio. The ones who* don't *advertise . . . who knows? – David N1GPH* RF

the tech side

by Michael Jay Geier KB1UM

More Kit Building

Last time, we were exploring the topic of kit building. Let's finish that up and move on to something new: connectors.

OK, so you've got your kit's PC board built up. If there are no dangerous voltages involved, now might be a good time to test the board. But if it runs on AC or generates high voltages, you would be wise to avoid applying power to it at this point, for safety's sake. Remember, nothing is worth hurting or killing yourself over.

Now what? Well, if the kit came with a pre-made cabinet, which many do, just follow the instructions for mounting the board and controls, and you're all set. If, however, the kit consists only of the PC board, it's up to you to find something to put it in.

Decisions, Decisions

There are lots of ways to house an electronic circuit. First of all, do you want it to look like a slick commercial product? If so, you're pretty much limited to buying a nice cabinet, drilling it and installing your circuit. Even then, you're faced with the task of making a pretty panel, and that is much easier said than done.

But why does it have to look like you bought it? For me, part of the fun of home-built gear is that it looks unique and funky. If you're of like mind, you now have a whole range of cheap, interesting cabinet choices.

Like What?

Like cassette boxes, 35mm film canisters, pill bottles, Tic-Tac boxes, floppy disk cases, you name it! If it's anything like mine, your house is brimming with free cabinets for your projects. Why spend $15 for a fancy box when you can put your gadget into something cute from your kitchen?

Naturally, your device must fit into the dimensions of the chosen box. Luckily, most electronic projects are pretty small these days. It certainly was more of a problem in the tube days, when you had to drill a chassis and mount a socket for a hot, glass part!

Electrical Considerations

Of course, there still are some things to watch out for. Some solid-state circuits can get quite hot, and you don't want those bottled up with no air flow or pressed against meltable plastic. In particular, voltage regulators and power transistors often dissipate enough power to require cooling. Even if your project doesn't call for a heatsink, check the temperature of the power-handling parts with your finger (with the power off and the power source completely disconnected, please—an on/off switch isn't enough!) after the device has run for awhile. If you can't touch it for more than a second or two, it's too hot and should be heat-sinked. If your project requires a heatsink on any part, consider mounting that heatsink where air can reach it. Also, be careful not to press the heatsink up against any plastic, because it may melt your cabinet! Even an eighth of an inch of clearance is a great deal better than none at all.

Shielded From Harm

If your gadget involves low signal levels, it may need some shielding to avoid picking up unwanted electrical noises. Such noises can come from appliance motors, street lamps and, of course, the output of your amateur transmitter! The easiest way to shield a circuit is to mount it in a metal box and connect the box to the circuit's ground point. With such an arrangement, it is very unlikely that any extraneous junk will get in. Of course, it is still possible for one part of a circuit to generate enough noise to interfere with another part of the circuit on the same board, but it doesn't happen very often. Besides, the kit manufacturer should have dealt with that in the design.

If you do go the metal box route, be extremely careful if your circuit runs on AC power or it has any high voltages in it. The last thing you want is for that AC to short to the box. One touch and it could be your last project! The only way I can feel comfortable about an AC-operated circuit in a metal box is if the box is grounded to the ground prong in a three-wire AC plug. That holds true even for commercially-built gear. I'm not wild about polarized plugs; not only are they a pain in the butt, they also depend upon the wall socket's being properly wired, and I have seen many that were done wrong. If it's backward and you come in contact with the hot side . . . well, you can guess the rest.

By the way, when I talk about AC-operated devices, I mean those in which the AC power actually enters the box. Projects which use those little wall cube transformers generally only have low voltage entering the enclosure, and I consider them pretty safe. I suppose it's possible for a short to make a wall cube dangerous, but I've never seen it happen. But, it never hurts to be careful.

Outward Bound

Shielding can be important for another reason. Some circuits, and especially digital devices using TTL chips, can generate lots of interference on their own! Not only might your new toy mess up your reception on 10 meters, it could also put trash on your neighbors' TV screens, and you don't want that, believe me. In fact, a good way to tell if your circuit requires shielding is to put it next to your TV while you try to watch a program on a channel below Channel 7, using the "rabbit ear" antenna built into the set. If the TV and the kit don't bother each other, everything is fine the way it is. If there is some interference, start moving the circuit away from the TV until it quiets down. If it only takes a few inches, it's probably no big deal. If you can still see the problem across the room, start looking for a shielded box!

Of course, there are ways to shield a circuit other than a metal box. You can use shielding foil over the offending circuits. Unfortunately, household aluminum foil just doesn't work for this purpose; it's too thin, it's the wrong kind of metal (aluminum makes a lousy shield) and you can't solder to it for the ground connection. Copper shielding foil is available and it works great, but you have to mail-order it and it ain't cheap. Much Japanese gear uses something called "mu-metal" shielding material, and it works extremely well. Usually, it is thick enough to be very stiff, but I've also seen it in foil form. I know of no place to buy this stuff in the U.S., but you can salvage some from dead VCRs, TVs, receivers, etc.

There are three rules of thumb regarding shielding:

1. The thicker the better.
2. Ground the shield to circuit board.
3. Insulate the shield, and don't let it touch any part of the circuit

Plugs and Jacks

If your kit requires connectors but doesn't provide them, you may have some decisions to make regarding which ones to use. It might seem obvious that you can use whatever you happen to have, but it really isn't a good idea. Some connectors are better suited to some jobs than others. For instance, you wouldn't want to use an earphone jack to couple an antenna to a transmitter, because the circuit could be damaged if you happened to pull the plug out of the jack while you were transmitting. Besides, the contact area is very small and it couldn't handle much power before overheating.

Let's take a look at various kinds of plugs and jacks and see which are best for which applications.

RCA jacks: These are the "phono" jacks like the ones on your stereo. They are also used for the video and audio inputs and outputs on VCRs. They have fairly large contact area and they tend to stay put. Also, they are coaxial (the plug's center protrudes from an outer shield) so the signal remains shielded when the plugs are plugged in. All in all, they're nice connectors, and cheap too. Many home-built low-power (QRP) radios use them for the antenna jack. At the 10-watt level, they're fine. I wouldn't try to run 100 watts through one, though. Also, be aware that because the tip of the plug sticks out quite a bit, the RCA plug is not suitable for supplying power from a power supply or batteries. That long tip is just looking to short against something when it is not plugged in. For signals, though, this connector is hard to beat. An added plus: It's an easy jack to mount on your panel.

Earphone jacks: They are very handy for audio input and output. Don't use them to supply power, because they tend to short momentarily as you plug and unplug them. Besides, they are easy to short when unplugged. Also, I find that they get dirty and make poor contact after awhile. They are easy to accidentally pull out, so you don't want to use them for transmitting antennas. Besides, their small contact area and unpredictable contact quality make them lousy where microvolt signals are involved, so they're poor even for receivers. I have a shortwave receiver which uses an earphone jack for the antenna, and touching or wiggling the plug always causes crackles in the signal. A plus: Like RCA jacks, earphone jacks are easy to mount because they require only a single hole.

Coaxial jacks: These are the ones used in much consumer electronics gear for connecting wall cube transformers to the sets. They're great for low-voltage DC power because the center of the plug is recessed, eliminating the shorting problem. They come in various sizes, which can make it a pain to locate matching pairs. It is wise to connect the circuit ground (almost always the minus terminal) to the outside of the jack, because it protects the positive terminal from shorts when using the device in the car. Remember, cars are negative-grounded, so any positive car power touching a metal car part is trouble. Even Sony, which for years put the negative at the tip and the positive on the sleeve, has figured this out and switched it around on their models.

A minus: The jacks are a pain to mount, because they usually require four small screws and drilling the holes very close to the main hole is quite tough. The best way is to mount the jack on the PC board by its leads and align it with the hole in the box.

DIN jacks: These are the round ones with anywhere from four to eight pins. They're very common in Europe but pretty rare here. For audio, they are excellent because you can combine various inputs and outputs in one plug. The pins are pretty close together, though, so you don't want to connect strong high-frequency signals unless you can tolerate their leaking into the other lines a little. Although they sometimes are used to supply DC power, especially in systems which require multiple power supply voltages, DIN plugs aren't ideal for that because the pins can be shorted against metal objects. The outer shroud keeps them reasonably well protected, though, so they are serviceable as long as they aren't used in the car.

In my experience, DIN jacks make very good connections, and they tend to stay put. Some even have locking capabilities. Unfortunately, they are not easy to mount, for the same reasons the coaxial jacks are difficult. With the DIN jacks, though, the whole assembly is bigger, so it's not quite as bad.

PL-259: These are the so-called "UHF" connectors which are found on CB, amateur and other HF (high frequency: under 50 MHz) radios. They work well as antenna jacks. The plugs are a real pain to connect to coaxial cable, and once you put one on you will never get it off. Despite the UHF designation, they aren't very good at UHF and higher frequencies. At one time, even 100 MHz was considered UHF! These connectors were not designed with gigahertz in mind.

PL-259s have large contact area and can handle any amount of RF power we hams are legally entitled to use, as long as the frequency is in range. HF kilowatt linear amps use PL-259s. However, there seems to be quite a bit of quality variation in these connectors. The cheap ones use insulating material that can heat up and melt under high power. They're fine for a 5-watt CB, but you shouldn't try to run your ham linear through them.

The jacks require multiple holes, but they are big enough that it is not too much of a problem.

BNC plugs: These are the kind used on laboratory oscilloscopes, HT antenna jacks and other gear involving very fast signals. They have small contact area, so they aren't to be used for high power. They lock on, making it unlikely you'll accidentally wreck a circuit by bumping into the wire. The BNC connector was carefully designed to have electrical characteristics similar to coaxial cable, so there is very little loss through it up through the UHF range. Some BNC jacks mount with a single hole, while others require closely-spaced multiple holes, making them difficult to mount. Also, the plugs can be hard to mount on various size cables. Finally, BNCs are not as easy to find as many other plugs. For audio, they're overkill. But for low-power RF, they're hard to beat.

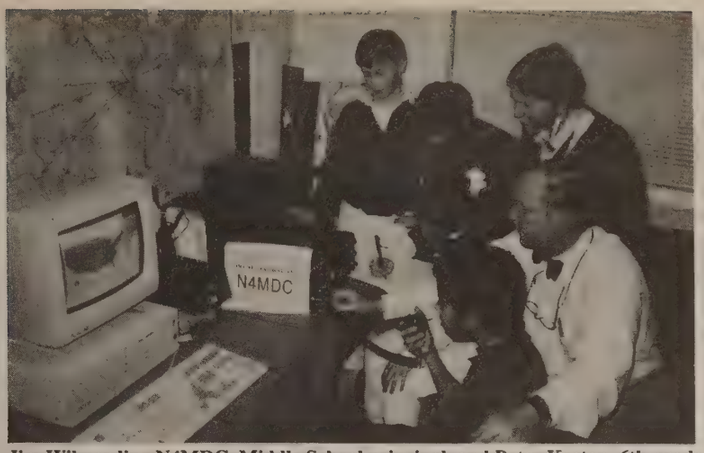
Molex-type power plugs: These are the square connectors made of plastic. They are used exclusively for supplying large amounts of low-voltage power. Many 12-volt HF rigs use them for their DC lines because they can pass the 20 amps of peak current without getting hot. They are not coaxial or shielded, so they aren't good for small signals. Besides, they're awfully big. Their square shape makes it hard to cut holes for them, but they snap right in with no screws.

DB-type computer connectors: These underutilized connectors come in 9- (DB9), 15- (DB15) and 25-pin (DB25) sizes, with the DB25s being the most common. Normally used for serial ports on computers, they are absolutely great for all kinds of small-signal and control line work. They give you the ability to connect lots of wires at once. Also, you can separate the signals fairly far from each other when you want to. I wouldn't use them for RF, high voltage or high current, but they excel when you want to send a few audio lines, or switch contacts, volume control or other signal lines back to the board.

With any connector, it pays to use the female part for the side which generates the power and the male one for the side receiving it. That way, the power is more protected when the connectors are unplugged. RF

what next?

by Carole Perry WB2MGP



Jim Wilmerding N4MDC, Middle School principal, and Betsy Kaston, 6th-grade geography teacher, with 6th-graders John Colfry, Zak Baig, Amanda Abrams, and Nihal Godiwala. Photo by Susan Houghtaling.

Classroom With Ears

"CQ, CQ, CQ. This is N4MDC, November-Four-Mike-Delta-Charlie, educational station in New Orleans, Louisiana, calling CQ and standing by for a call—K, someone please."

"N4MDC, N4MDC, this is LY3BH, Alex, in Kaunas, Lithuania, returning your call. Do you copy?" With that cryptic exchange, St. Martin's Episcopal Middle School radio club students initiate a two-way contact with a foreign ham radio operator. They are off and running!

Jim Wilmerding N4MDC, a ham radio operator for the past 20 years, is sharing his exciting hobby with his middle schoolers. Through the generosity of individual parents and the Dads' Club, he has been able to set up a full transmitting/receiving station in one of the classrooms.

The 6th-grade students in my amateur radio class at Intermediate School 72 in Staten Island, New York, first met Jim and his students back in December 1991, when they checked into the CQ All Schools Net. Because St. Martin's School is strategically located between our location on the East Coast and our other net control, Gordon West WB6NOA's station in Costa Mesa, California, we were able to speak with some schools that are usually hard for us to hear. Jim and his students have been such a big help to us in relaying messages and providing another access into the net that we've invited N4MDC to act as a third net control, thereby allowing more school children to join us on Tuesdays and Thursdays at 17:30 UTC on 28.303 MHz.

Jim tells me that his students may pursue their radio interests as far as they would like. Some of them simply enjoy participating in the conversations with the other stations, especially with other school kids. Others really "catch the bug" and begin to study for their own license. Many of Jim's students have become pen pals with their counterparts in my classes. My kids really look forward to receiving mail from the St. Martin's Episcopal School, and they all love the beautiful certificate they get from the school when they have a successful contact. Right now, our kids are in the process of planning a video tour of our New York City school for purposes of comparison and enlightenment with the children in Louisiana. Based on some of the information the children have shared and exchanged on the air so far, we'll all be in for a few oohs and ahs when the respective videotapes from both schools arrive.

Jim shares with me the belief that Morse code should be presented as a fun, secret language to converse with friends and to communicate with people all over the world. This enthusiastic Head Master tells me that as time goes on, more and more students become comfortable picking up the microphone and actually talking to that unknown voice coming out of the speaker. They may never get the chance to meet face-to-face, but an instant bond of friendship and real interest is established as the children share little parts of their lives while in contact with that other station.

As the new Middle School Head Master, Jim presents quite the striking picture with his red suspenders and argyle socks and the printed handkerchief deliberately jutting out of his back pocket. He is looking to introduce a more interdisciplinary approach to his school, and he knows full well the vital part that ham radio in the classroom can play in implementing this goal.

Jim's school is just one of the many interesting schools across the country taking advantage of the wonders that a teacher can bring to his or her students by getting them exposed to amateur radio. Please join the N4MDC station and all the others eager to share experiences and ideas on the CQ All Schools Net.

The St. Martin's Episcopal School is located at 5309 Airline Highway, Metairie LA 70003-2499; packet BBS N5SSY. RF

Radio Fun flea market

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it, rather than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar, and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The *Radio Fun Flea Market* costs you peanuts (almost)—comes to 10 cents a word for individual (noncommercial) ads, and 70 cents a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple of months before the action starts; then be prepared. If you get too many calls, you priced it too low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right, and maybe you can help make a ham newcomer or retired old-timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested.

Send your ads and payment to *Radio Fun Flea Market*, Sue Colbert, Forest Road, Hancock NH 03449 and *get set for the phone calls.*

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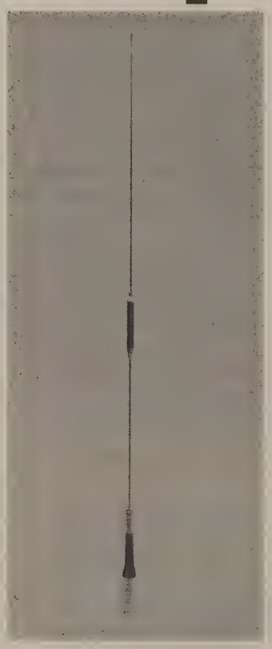


NCG

NCG/COMET Antenna has released the CX-224 2m/220/440 MHz Triband Mobile Antenna, the first ever with gain. The high-quality construction and materials COMET is known for are used to create a durable antenna with excellent appearance and performance. The CX-224 radiates 1/2 wave on 2m with 2.15 dBi gain, a 5/8 wave on 220 MHz with 3.2 dBi gain, and 2-5/8 waves on 440 MHz with 5.5 dBi gain. It is 37" long and is made with a hinged base to allow the element to fold over. It has a PL-259 connector, and is also available with an NMO connector (CX-224NMO). A triplexer is also available: CFX-324A has coax leads, CFX-324B does not; both have UHF connectors.

The introductory price for the CX-224 is $79.95. Contact *NCG, 1275 North Grove Street, Anaheim CA 92806; (714) 630-4541, Fax: (714) 630-7024.* Or circle Reader Service No. 202.

TIARE PUBLICATIONS

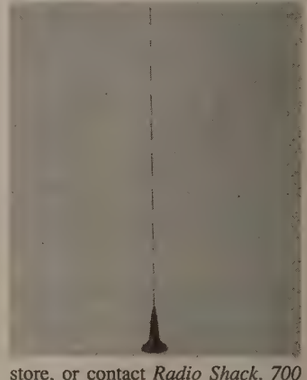
A new book from Tiare Publications, *Monitoring NASA Communications*, by Anthony R. Curtis K3RXK, will help NASA and space enthusiasts circumvert the often thin or nonexistent space coverage provided by the major media and, instead, stay up-to-date with information direct from the source. The book includes a history of rocketry and how NASA came to exist. It discusses space satellites in general, as well as communications satellites, weather satellites, navigation satellites, space shuttles and deep space probes. NASA radio frequencies are broken down by usage, and there are tips on the equipment needed , plus a quick-tuning guide to space shuttle and amateur radio shuttle retransmissions, followed by what the author describes as "the world's largest list of NASA radio frequencies."

Monitoring NASA Communications retails for $14.95, plus $2 S & H. For more information, contact *Tiare Publications, P.O. Box 493, Lake Geneva WI 53147; (414) 248-4845.* Or circle Reader Service No. 205.

RADIO SHACK

Radio Shack® stores nationwide are now offering a new magnetic mount amateur radio antenna that operates in the 2 meter ham band (144-148 MHz frequency range). It is ideally suited for use with the recently introduced Realistic® HTX-202 2 meter VHF FM hand-held transceiver (cat. no. 19-1120). The antenna features a sleek, black tapered 5/8-wave stainless steel whip that provides 3 dB of gain by concentrating more power toward the horizon. The antenna can handle over 100 watts. The base contains a two-pole magnet capable of withstanding 85 mph winds. The molded covers are made of black weather-resistant ABS plastic. The antenna comes with a 16-foot RG-58 low-loss coaxial cable with PL-259 connector.

The 2 meter antenna (cat. no. 19-210) sells for $37.95. For more information, visit your local Radio Shack store, or contact *Radio Shack, 700 One Tandy Center, Fort Worth TX 76102; (817) 390-3300.* Or Circle Reader Service No. 201.



NARA

The National Amateur Radio Association has introduced a unique book called *UPGRADE!* by Don Stoner W6TNS, which provides strong motivation for those wishing to advance to a higher license class. The largest chapter is devoted to Samuel F.B. Morse and his code. Numerous hints for becoming code-proficient are provided by Fred Maia W5YI and Gordon West WB6NOA. They explain how to avoid the dreaded speed plateau at 8-9 wpm. The material covers upgrading to the code requirements of Tech-Plus and higher license classes. The remaining chapters are tied to the nine subelements contained in the General class question pool. Stoner discusses the theory behind the questions, and the correct answers, in an easy-to-understand manner. The theory in each chapter is followed by the questions found in the subelement. A correct answer key is located at the end of the book.

UPGRADE! is priced at $9.95 and is available at all major amateur radio stores, or from NARA (add $2 S & H). Contact *The National Amateur Radio Association, P.O. Box 598, Redmond WA 98073; (206) 869-8052, Fax: (206) 861-5780.* Or circle Reader Service No. 204.

Uncle Wayne's Bookshelf

BOOKS FOR BEGINNERS

20N018 **Technician Class License Manual: New No-Code *by Gordon West*** This book will cover everything you need to become a Technician Class Ham. Every exact question and answer on the examinations is found in this one book covering element 2 and element 3A question pools. Gordon West tells you the right answer and then explains in detail why the answer is correct. Fully illustrated text, frequency chart showing privileges, list of examiners and an FCC Form 610 application. **$9.95**

20N092 **The Wonderful World of Ham Radio *by Richard Skolnik, KB4LCS*** This book addresses the plea that something simple, clear, and fun be written to introduce young people to amateur radio. Pick up one for the new ham in your life. **$7.95**

20N099 **Digital Electronics Projects for Beginners *by Owen Bishop*** contains 12 digital electronics projects suitable for the beginner to build with the minimum of equipment. 128 pp., 56 line drawings **$12.50**

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06S57 **1992 Passport to World Band Radio *by International Broadcasting Services, Ltd.*** You can have the world at your fingertips. You'll get the latest station and time grids, the 1992 Buyer's Guide and more. 384 pages. **$16.50**

07R25 **The RTTY Listener *by Fred Osterman*** New and expanded version. This specialized book compiles issues 1 through 25 of the *RTTY Listener Newsletter*. It contains up-to-date, hard-to-find information on advanced RTTY and FAX monitoring techniques and frequencies. 224 pages. **$19.95**

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03S208 **Radioteletype Press Broadcasts *by Michael Schaay*** Covers schedules of Press Services by time, frequency, and country broadcasting in English, French, German, Spanish, and Portuguese. Detailed Press Agency Portraits. 120pp. **$12.95**

03K205 **Guide to Radioteletype (RTTY) Stations *by J. Klingenfuss*** Updated book covers all RTTY stations from 3MHz-30MHz. Press, Military, Commercial, Meteo, PTTs, embassies, and more. 105 pp. **$12.95**

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20N101 **Everyday Electronics Data Book *by Mike Tooley BA.*** Information is presented in the form of a basic electronic recipe book with numerous examples showing how theory can be put into practice using a range of commonly available `industry standard' components and devices. 256 pp. 134 line drawings. **$18.00**

02C30 **The Commodore Ham's Companion *by Jim Grubbs K9EI.*** 160 pages of useful information on selecting a Commodore computer for the ham shack, where to find specialized programs, the Commodore-packet connection, and more! **$9.50**

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RF0492

WB8ZJL's Top Ten Reasons Why a Ham Would Be a Lousy President

10. Adds 23 more stars to the American flag, bringing the total to 73.
9. Replaces the phrase "CQ" with "YO!". (I'm sorry, that's why M.C. Hammer would make a lousy ham.)
8. Orders that handie talkies be carved into the rock on Mount Rushmore.
7. Has the dome of the Capitol Building inverted, uses it as personal TVRO dish.
6. Will not allow "tech-lites" to hold public office.
5. Secret Service men keep getting skewered on all the antennae on the presidential limo.
4. Sends Yeltsin his mail via Box 88.
3. Annoys Congress by saying he's busy in the basement of the White House, working on a "project."
2. Ends every other sentence with "QSL?".
1. In the middle of the State of the Union address, starts complaining how rotten 10 meters has been lately.

TNX "Tuned Circuit," February 1992, Volume XXVI.

Pager Scam!

We have received information regarding a pager scam taking place, and you may want to be aware of what it is and how it works.

If a pager owner/user gets a page with the phone number (212) 540-XXXX (where XXXX can be any four numbers) . . . DO NOT CALL THIS NUMBER.

As you know, 212 is the area code for New York City, but the 540 exchange acts *the same way as a 1-900 number*, where the phone from which you are calling is automatically billed. The fee for calling these 540 numbers is $55!

The people with these numbers are calling around the country and inserting these numbers into pagers so the individual will call; the fee is then collected. If you have a pager, please beware. *TNX Trevor KK6DO via "The Q-Fiver," March 1992.*

Russian Robinson Award

The Russian Robinson Club is offering a diploma for QSO/SWL with amateurs on islands belonging to Russia. The diploma has three classes:

Class 1. 20 different stations on 10 different islands.

Class 2. 16 different stations on 8 different islands

Class 3. 10 different stations on 6 different islands.

Each QSO counts double for stations or SWL located on islands. There are no limitations on the date of the QSO, the bands, or the modes.

The fee for each class is 12 IRCs or six US dollars. For a list of Russian islands with their numbers (RRA list), send two IRCs or one US dollar. Send your list (no QSLs) by registered letter, along with the fee, to: *Award Manager UA3GPA: Valery Sushkov, PO Box 3, 398000 Lipetsk, Russia.*

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All-Mode HF Transceiver

- **Frequency Coverage:** 100 kHz – 30 MHz RX (160-10 m TX)
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- Built-in High Speed Antenna Tuner w/39 Memories
- RF FSP (RF Frequency-Shifted Speech Processor)
- Dual VFOs with Direct Digital Synthesis (DDS)
- 90 Memories which store Frequency Mode and Bandwidth
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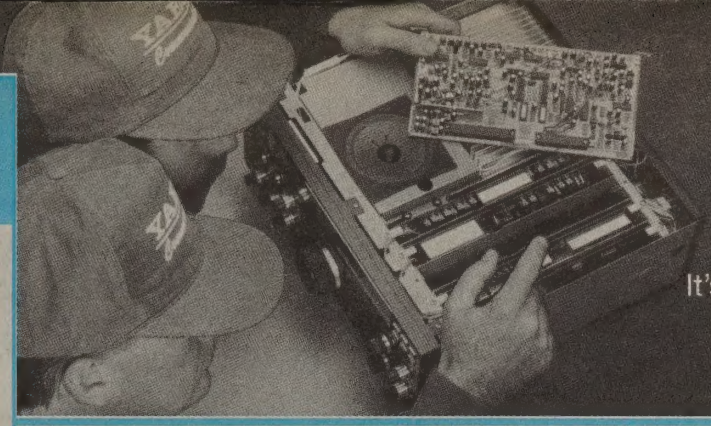
- Band Stacking VFO System
- Multi-mode Selection on Packet/ RTTY; Easy interface to TNCs
- Adjustable RF Power
- Variable Threshold Noise Blanker
- Optional Digital Voice Recorder (DVS-2)
- Front Panel RX Antenna Selection
- **Accessories:**

FT-990DC	Available without power supply
XF-10.9M	2nd IF SSB Narrow 2.0 kHz Filter
XF-445K	2nd IF SSB Narrow 250 Hz Filter
TCXO-2	High Stability TCXO
SP-6	External Desk-top Speaker
MD-1C8	Desk Microphone
DVS-2	Digital Voice Recorder Unit
YH-77ST	Lightweight Headphones
LL-5	Phone Patch Unit for SP-6 Speaker



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Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

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The ICOM IC-725 is surprisingly low priced, while offering features and performance found on radios costing much, much more.

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